No. 1877 Vol. XLVI DECEMBER 14th, 1944

FLIGHT

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AIRCRAFT ENGINEER

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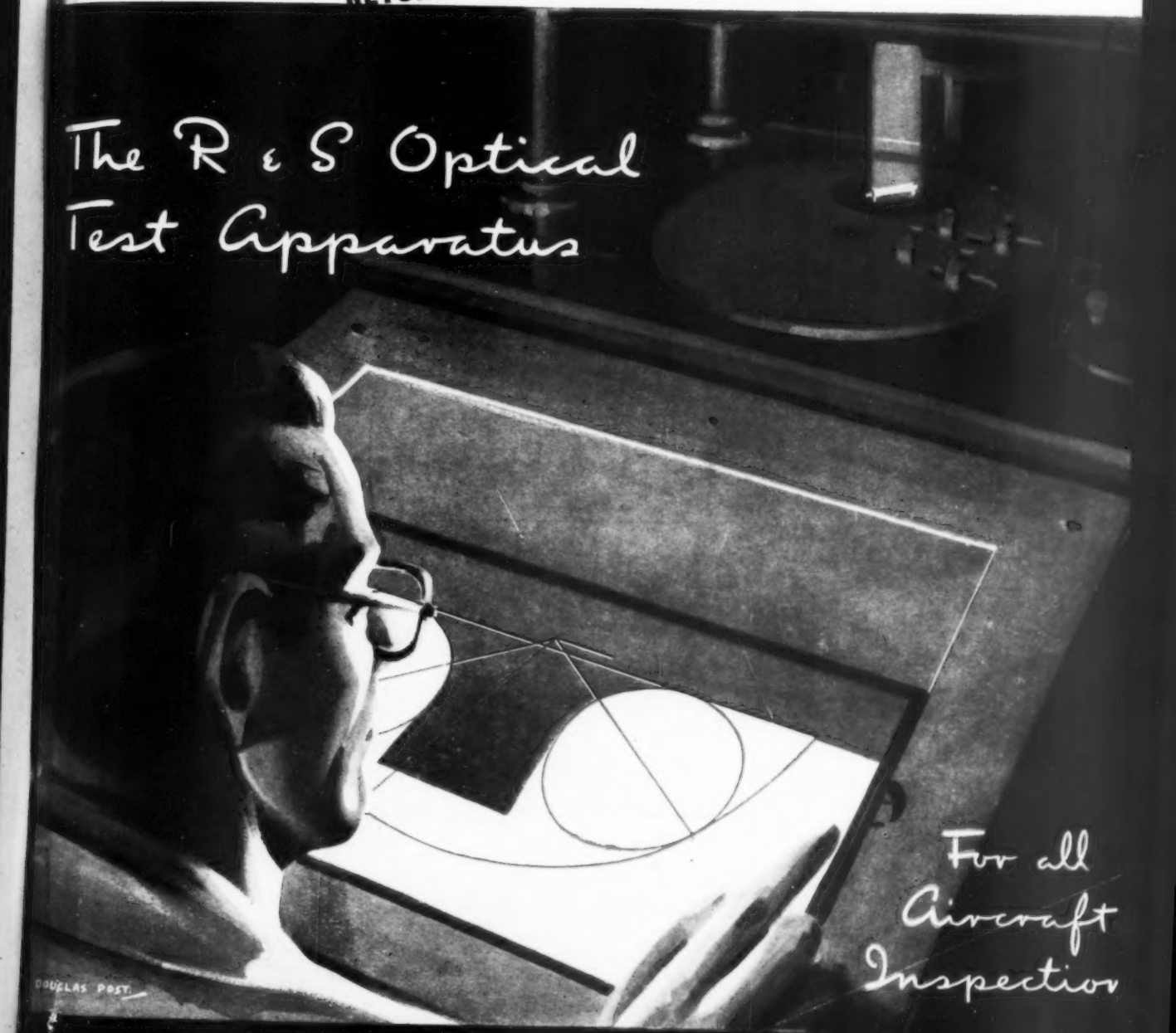

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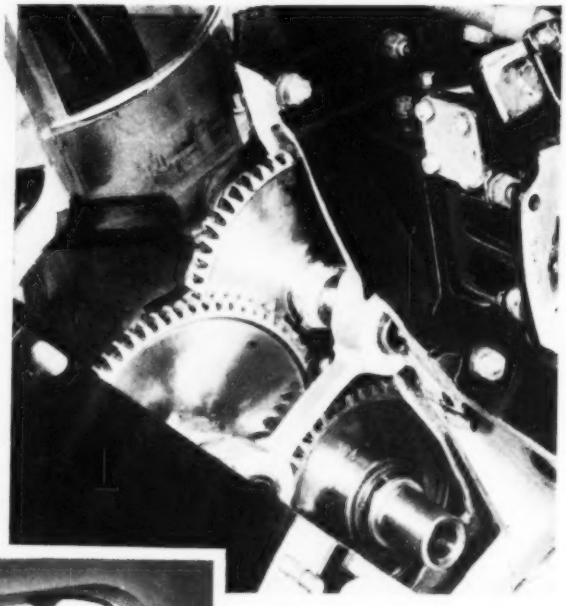

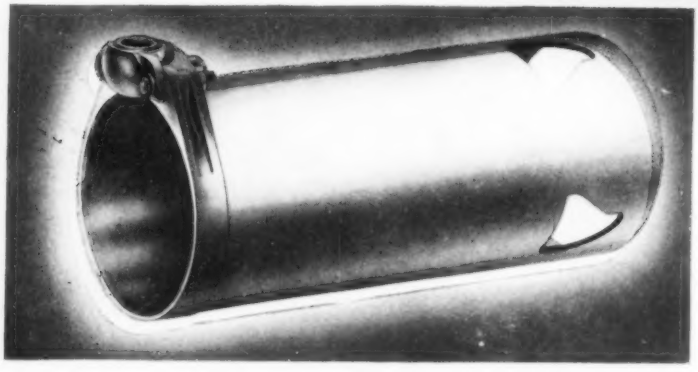

This is one of a series of twelve advertisements prepared for retention, and constitutes a simple story of sleeve-valve advantages. Previous copies are available on request to the Bristol Aeroplane Company Ltd., Bristol.

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"Bristol" pioneered and developed the single sleeve-valve engine

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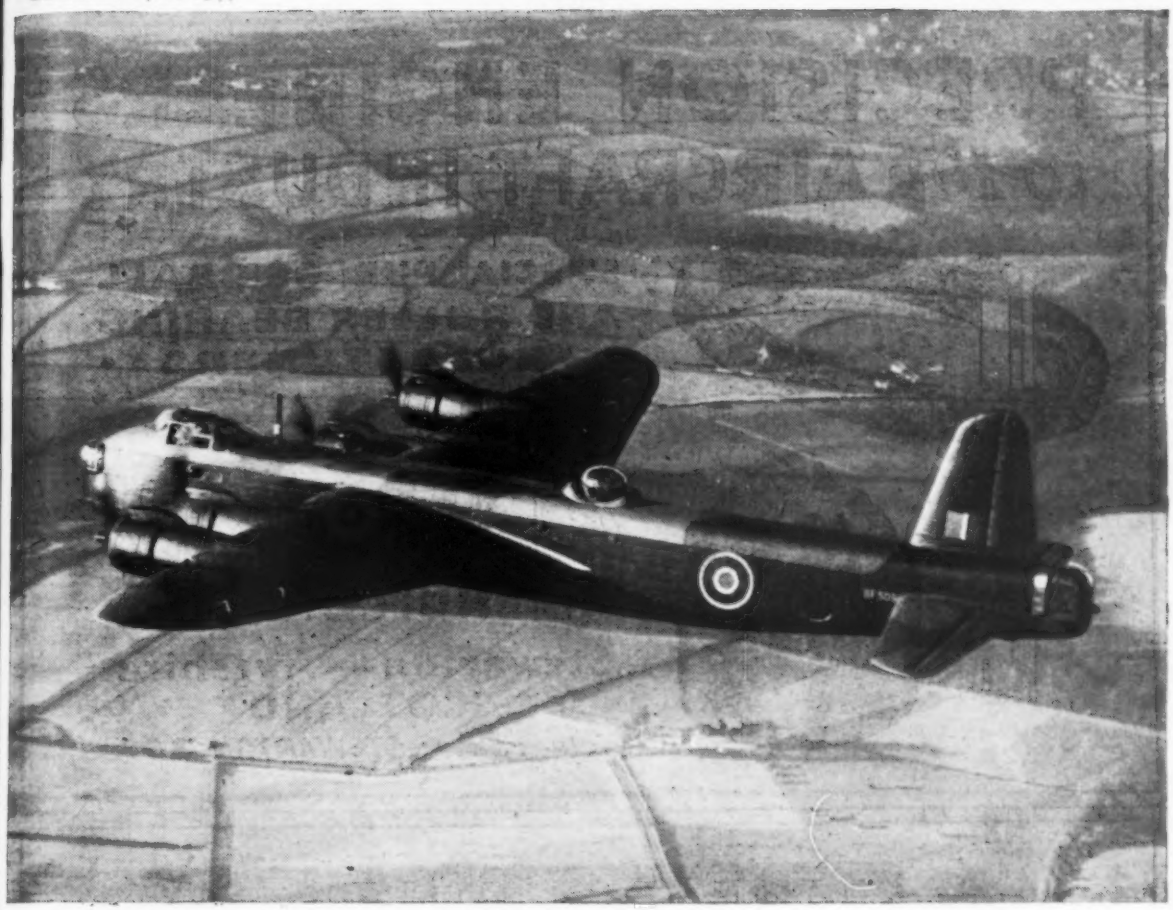

The STIRLING, SHORT'S Contribution to the Night Bomber Offensive *Short and Harland Photograph*

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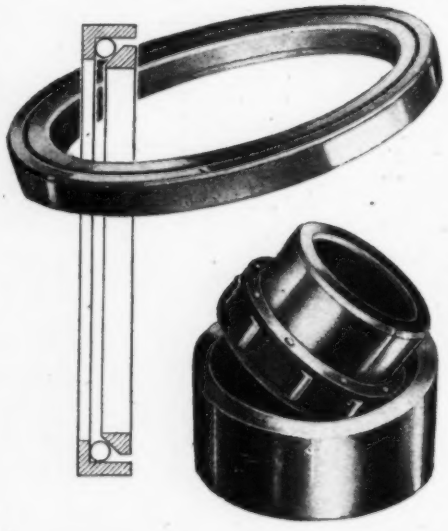

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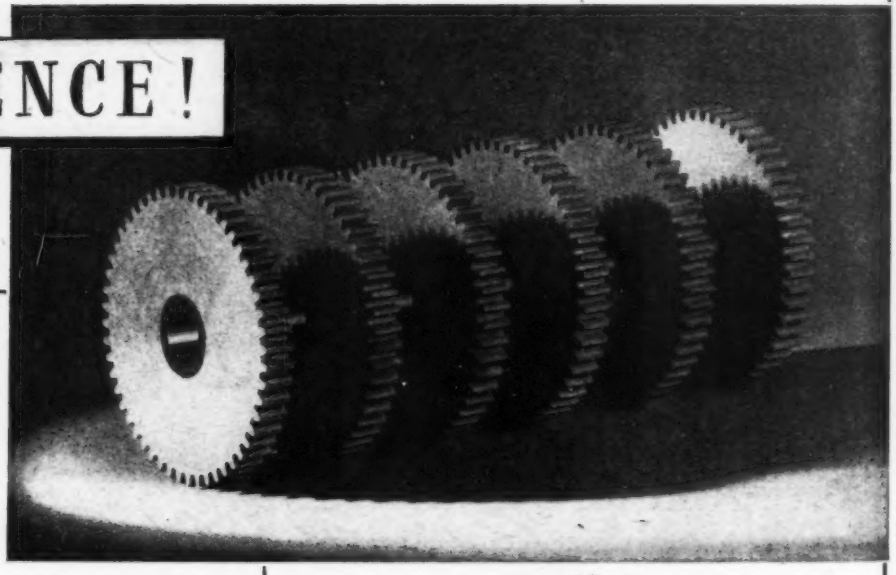

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FLIGHT
and
AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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C. M. POULSEN

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The Outlook

After the War

LORD TRENCHARD was certainly looking well ahead when he started a debate in the House of Lords on the future organisation of the three Fighting Services. It is a good thing to look ahead; but obviously it is still too early to expect the Government to pronounce a policy on the subject. Probably Lord Trenchard had no expectation of drawing the Government to that extent, but only wished to set men's minds at work on the problems involved.

The greatest question of all is whether we ought to abolish the three separate Services and amalgamate them all into one. Thoughts have been turned in that direction by the numerous appointments of Supreme Commanders who have had authority over all three Services. It is a plan which has paid excellent dividends; and yet we are inclined to agree with Lord Trenchard that a single Fighting Service would not be the best thing. For one thing, its unity could only be nominal. The Navy, in particular, must always be a thing apart from everything else. If one Service means one uniform, as it should do, it is impossible to conceive the Navy giving up its distinctive and much-loved uniform, or either of the other Services adopting it.

We are also with Lord Trenchard in deprecating one College for all cadets and one College for all staff officers. Sailors, soldiers and airmen must all be specialists at their own form of warfare, and need specialist education in its theory and practice. Lord Trenchard was probably correct in saying that the Imperial Service College needs drastic improvement and enlarging, and it certainly ought to be residential. We would add the suggestion that every officer who graduates at the Staff College of his own Service should automatically proceed to a course at the Imperial Service College. There he should be taught how to become a competent planner or leader of Combined Operations. As Lord Selborne said in his reply for the Government: "If this war has proved anything, it is the interdependence of the three Services on each other."

As for the question of voluntary or compulsory service, it would be very good for the country, and for each individual, that every fit man should spend a certain minimum time in training for war—not necessarily in the regular forces but in the Territorial Army, the R.N.V.R. (or R.N.R.), or the R.A.F.V.R. (or A.A.F.).

Lord Trenchard raised the question of short-service commissions, which he introduced into the Royal Air Force. In his speech he tried to justify them. We have always thought that they were a bad bargain for the men who accepted them, and preferred the idea of increasing the number of airmen pilots. We should be equally averse from them in the Navy or Army. It is best that regular officers should enter a Fighting Service with the intention of devoting their working lives to it, but that does not necessarily apply to other ranks.

The Pattern—with Variations

THE Allied air/ground battle plan has stood the test of time and place. In its simplest form it was operated in the deserts of North Africa, where all supplies had to be carried along a few roads and, in parts, one railway.

The first essential was air superiority—or air supremacy if it could be achieved. Then came the denying of supplies to the enemy's front-line troops by air attack on his communications. While this was in process of achievement our ground troops kept elbowing and nudging the enemy in order to make his maintenance of the line as expensive as possible. When the

time was considered ripe, all our air forces were concentrated on front-line targets and our armies delivered a full-scale attack. The surge forward carried them to the next line of defence, where the pattern was repeated.

From the point where air superiority is established, the enemy is on the horns of a dilemma. If he struggles to get heavy equipment up to the front by devious methods, then he stands an excellent chance of losing it all in the inevitable retreat when it comes. If, on the other hand, he decides not to risk his heavy equipment, then retreat merely becomes more precipitate.

The pattern has, however, one serious flaw. Our own troops have to advance over the ground and communications pounded by our air forces. In Italy we were held up by the inability of our armoured columns to move over the debris of villages. In France the blowing-up of all the bridges over the rivers Seine and Loire enabled us to give the Germans a sound thrashing, but, during the great advance our own flow of supplies was handicapped to such an extent that the forward movement petered out at a crucial point. For this very reason it is doubtful whether we should have been able to take full advantage of the airborne landing at Arnhem, even had that operation been an unqualified success. In the latest battles, which are probably designed to carry Allied arms at least to the Rhine, our air power has concentrated on destroying rail and canal communications in the back areas only. It appears as if the British and American armies have asked the Allied air forces to leave the river bridges alone. It will be interesting to see whether the benefits accruing from this change in the pattern will, in the long run, favour ourselves or the enemy. Our impression is that the Germans, when they retreat, will blow the bridges anyway, and that our soldiers might just as well have the advantages to be gained from blowing the bridges now. The Rhine is both wide and fast-flowing and difficult to bridge. There is just a slender chance that the enemy will preserve the bridges for their own sake.

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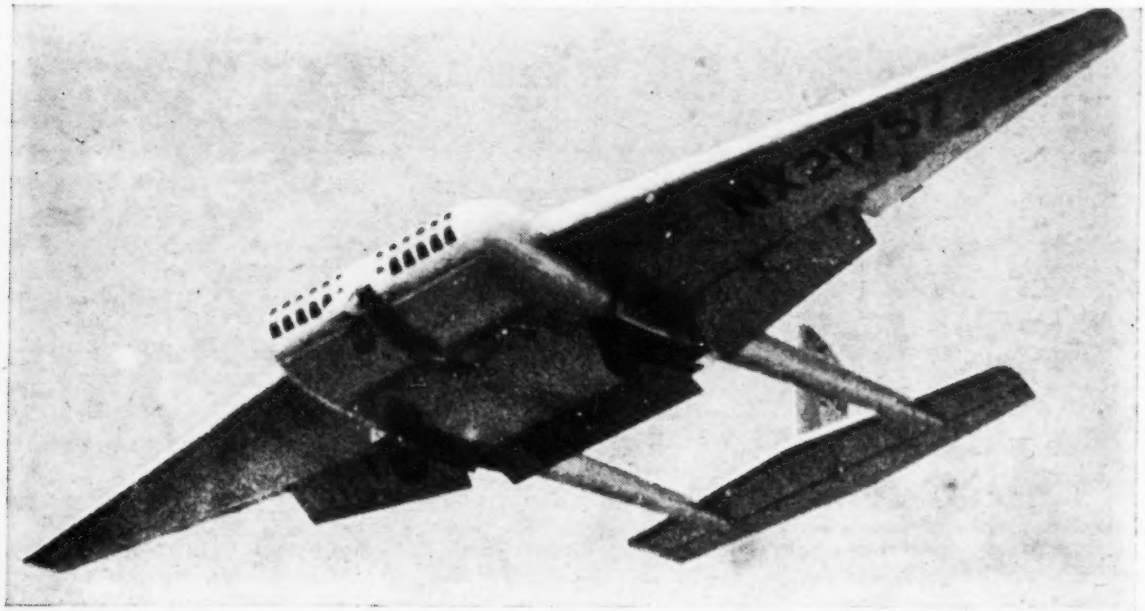
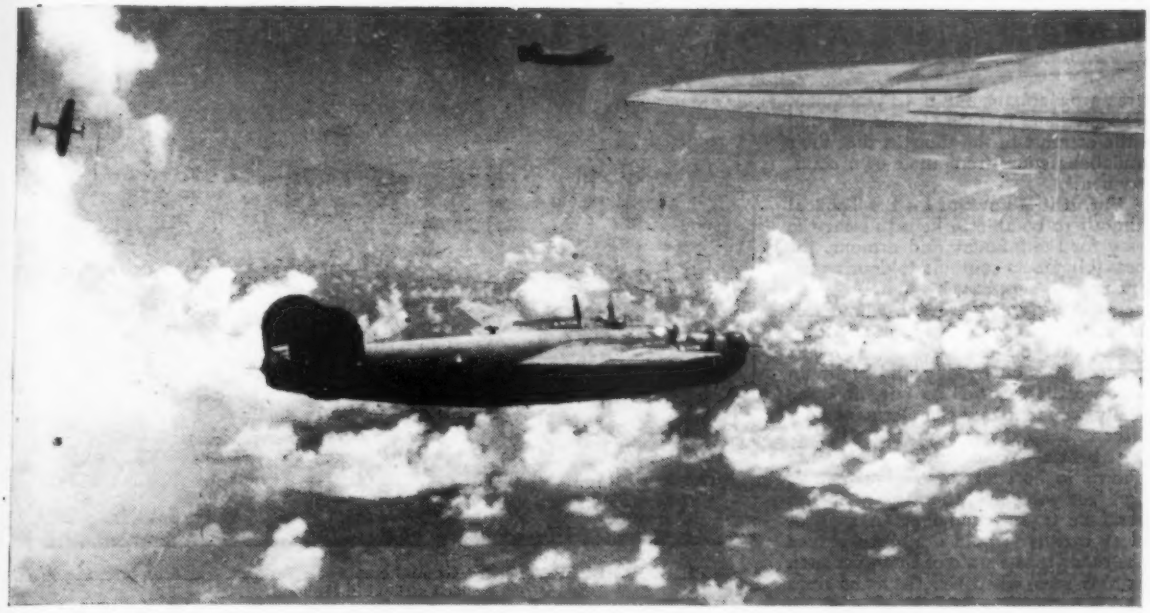
We Have "Had It"

LAST week we commented that unless a miracle happened the Chicago Conference would have to be considered a failure. The miracle did not happen, and the net result of the protracted discussions is that the delegates have agreed on freedom of innocent passage and freedom to land for fuel—two freedoms, as we said last week, without which there could be no international aviation.

On looking back it is not difficult to see reasons for our failure to carry the British point of view. The issue of the White Paper on British policy, the appointment of Lord Swinton, and the absence of an opportunity to have a sensible debate in the House before the Chicago meeting. The whole method of setting about the matter was wrong from the beginning. Lord Swinton, hard worker that he is, did all any man could have done in the circumstances. But obviously the Americans had all their plans cut and dried before the Conference; the debates and all the fine phrases were so much eyewash. Many voices in the United States had said quite frankly beforehand that America wanted world domination in the commercial air. Chicago confirmed it.



LIFTING FUSELAGE: The latest American Army glider, the XCG-16, has a distinct Burnelli look about it. For the first time a retractable tricycle undercarriage is fitted.



LIBS. OVER BURMA : R.A.F. Liberators, with Thunderbolt fighter cover, on their way to make a daylight attack on Rangoon.

WAR in the AIR

A Break in the Rains : Germans Bomb Their Own Towns : The Leuna Problem : Japanese Convoy Sunk

WHEN the weather keeps most aircraft aground, the task of the recorder who has to write about the war in the air is not an enviable one. His woes, however, are nothing in comparison with those of the ground troops who have to force their way ahead without very much assistance from the air. A day of comparatively clear sky occurs occasionally, and the difference it makes is very marked. Last week there was a break in the rain, and at once the Strategical and Tactical Air Forces on the Western Front celebrated it by putting in over 4,000 sorties in the first 24 hours. The Germans' most sensitive points were selected for attack. In the night the American Black Widows went out and found convoys moving along the roads between Saarbrücken and Kaiserslautern. The night-fighters did what was expected of them. If only all enemy movements by day as well as by night could thus be strafed, the Battle of the Rivers, as it has been called, might soon turn definitely in favour of the Allies. As things are, they force their way forward without stopping, but with one of their arms, so to speak, tied behind their back.

The *Luftwaffe* also makes an occasional appearance when the weather is fine enough, but it is in no condition to dispute the mastery of the skies with the Allies. As the Americans force their way further into Germany beyond Aachen, German guns and German aircraft have felt themselves constrained to shell and bomb German towns in which the Americans had established themselves. Phosphorus shells have caused fires in Linnich, while German bombs have been dropped on Inden and Eschweiler. It is gratifying to reflect that, if civilians have to suffer, the sufferers in that

SORTING OUT THE BITS : Technical officers of the R.A.F. examining parts of a Messerschmitt 262 shot down near Helmond in Holland. The remains of one of the jet power units is on the left.

WAR IN THE AIR

area are Germans and not Frenchmen. The civilians in those towns can find little comfort in the thought that their afflictions come from their own countrymen.

But, if it is unusual for the Tactical aircraft to be able to help to clear the way for the infantry and armour, the heavy bombers continue to deprive the enemy of supplies by bombing his marshalling yards close behind his lines, and repeatedly raining down destruction on his oil plants. This process goes on by day and night, in foul weather as well as fair, and one really wonders how the Germans contrive to keep any transport at all moving behind their lines. They are known to be short of oil and petrol, and yet somehow the supply lorries continue to keep moving. A spell of clear weather would doubtless reduce the roads to the state of shambles such as was seen when the Germans were trying to break out of the ring drawn round them in Normandy.

Too Durable

ALTHOUGH the Germans are known to be wonderfully good at repairing damage, they obviously cannot make good in a few days all the havoc wrought by British and American bombs. It is, therefore, astonishing to note how frequently the Allies have to return to the synthetic oil plant at Leuna, near Merseburg. From the number of attacks which it has endured in recent months one would have concluded that the whole place had been reduced to a pile of rubble. The same remarks apply to Cologne. Yet still the heavy bombers of the two Western Allies continue to visit both these places. On Wednesday last week both the Americans and the British sent strong forces of heavy bombers to Leuna; so that evidently there was still something there which needed to be destroyed. On this occasion Bomber Command used vast quantities of fire bombs, and they certainly ought to make a mess of oil, whether synthetic or not.

Leuna and the other places attacked that night were strongly defended by night fighters and *flak*. Considering how loath the Germans now are to risk their fighters in air combat, this shows that they still considered Leuna a valuable asset. Although the attack was made at night, our Lancasters were supported by night fighters and intruders, and the enemy lost at least 17 machines, while we lost 21 aircraft in all. It would be very satisfactory if we were to hear less about Leuna in the future.

AMPHIBIOUS OPERATIONS: Ground crews of a Tempest squadron working on a flooded airfield in Holland.

It is much less gratifying to hear that R.A.F. aircraft have had to be used in Athens to machine-gun the E.L.A.S. rebels. Gen. Scobie has said that only a small number were used, and only over areas free of houses. Greeks are splendid when they are fighting against a foreign foe, and it is a thousand pities that when there is no foe in the gates they seem incapable of refraining from fighting each other. Much of the fighting on the ground, where British forces are helping the legitimate Government of Greece, has been done by a British parachute regiment. They seem to have arrived by land, not by air, but they were used because they are very tough and very well-trained soldiers.

Pacific Activities

AMERICAN Superfortresses from Saipan (which has recently experienced a mild earthquake) have again bombed Tokyo by both night and day, though the raids were on a small scale. A stronger attack was made on Mukden and the port of Dairen. They lost one machine over Mukden, but destroyed 26 Japanese fighters, plus 13 probables and 24 damaged. The Japanese are still more lavish with their fighters than the Germans can afford to be, but they are not very effective in protecting towns attacked by the American bombers.

The Japanese attempted an air raid on Saipan on December 6th, but it was beaten off by the fire of the American warships. American troops have made a new landing on the west coast of Leyte Island. The Japanese tried to get another convoy of reinforcements through to the port of Ormoc at the

CONTRACT BRIDGE: Salvos of rocket projectiles from S.A.A.F. Beaufighters of the Balkan Air Force reduce a road bridge at Gorica, in Yugoslavia.

WAR IN THE AIR

same time. It was wiped out by U.S. aircraft, and the enemy lost 13 ships, 4,000 troops, and 62 aircraft. They did manage to drop some parachute troops somewhere in the island, and it is reported that these did some damage before they were almost entirely wiped out.

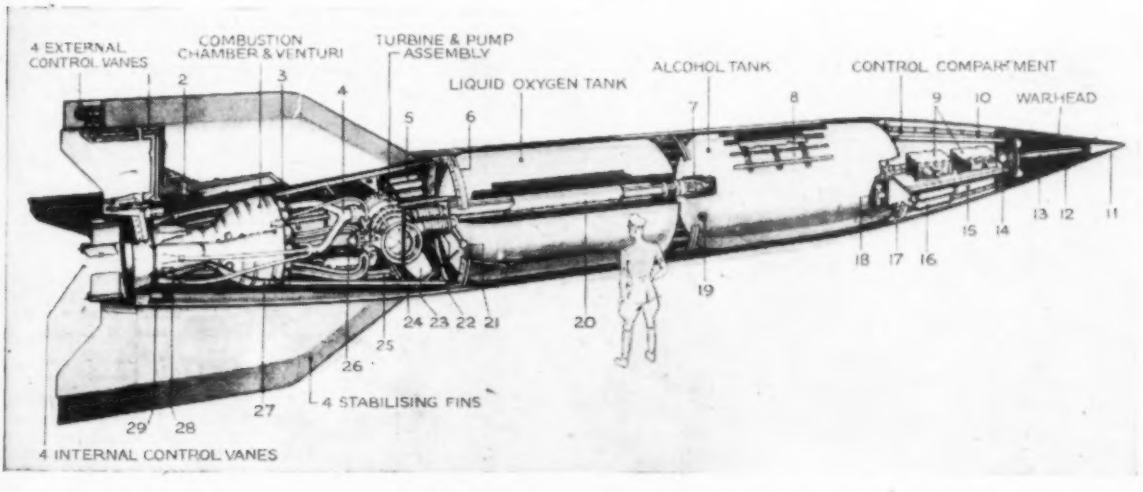
Only in China are things going at all well for the Japanese, where Gen. Wedemeyer has said that their drive on Kweiyang faces the Allies with a serious military situation. The Chinese, however, have recovered some of the lost ground. Since the above was written the news has come in that the Americans in Leyte have captured the port of Ormuc. The Japanese in the island will now find themselves in acute difficulties.

Sea and air power in the war against Japan are so inextricably connected that naval reorganisations have a natural interest for readers of *Flight*. The weight of the naval preparations for dealing with that last enemy are shown by the decision to divide the British Fleet out East into two. Admiral Sir Bruce Fraser (who recently commanded the Home Fleet) has been appointed C.-in-C., British Pacific Fleet. Admiral Sir Arthur Power becomes C.-in.C., East Indies Station. The United States remains in charge of Pacific operations, and the British Fleet will act under the command of Admiral Nimitz in the central Pacific, or under Gen. MacArthur in the south-west Pacific as the situation demands. The time is approaching when it will be necessary to cut the Japanese sea routes between their homeland and all the occupied countries. This should be work for the Allied carriers, protected by full battle fleets. The distances are enormous, but the use of carriers makes it possible to cover areas of ocean which would be almost immune from interruption in an earlier age.

Meanwhile, in Burma the various columns of the 14th Army have been racing towards Mandalay. It would doubtless be a great thing to recapture that important city, and it would do a lot to restore British prestige in the East, which has certainly suffered from our various set-backs.

BACK TO BATAAN : An Essex-class aircraft carrier of the U.S. Navy on its way to the Philippines as seen from the deck of another ship in the task force.

VERGELTUNGSWAFFE–ZWEI



Prepared by the Air Ministry this sectional diagram shows the principal features of the new German long-range weapon, and corrects the many fanciful, inaccurate and fantastic accounts which have appeared.

Overall dimensions are length 46ft. and diameter 5ft. 6in. The main tanks carry 7,500 lb. alcohol, and 11,000 lb. liquid oxygen for propulsion. Smaller tanks contain hydrogen peroxide and calcium permanganate which on combustion forms superheated steam for the turbine driving the alcohol and oxygen pumps.

The numbered details indicate :—1. Chain drive to control tabs on external fins from 2, electric motor. 3. Injection nozzles on main combustion chamber. 4. Alcohol delivery piping. 5. Compressed-air bottles. 6. Rear joint ring and lifting point. 7. Servo-controlled alcohol valve. 8. Shell casing support structure. 9. Radio control equipment. 10. Pipe from warhead to alcohol tank. 11. Nose with fusing switch. 12. Conduit for fuse wiring. 13. Exploder tube. 14. Electric fuse for warhead. 15. Plywood support for radio. 16. Nitrogen bottles. 17. Front joint ring and lifting point. 18. Gyros for pitch and azimuth. 19. Alcohol tank filling point. 20. Insulated alcohol feed pipe. 21. Oxygen tank filling point. 22. Expansible bellows connections to alcohol and oxygen pumps. 23. Hydrogen peroxide tank. 24. Tubular support frame for turbine and pumps assembly. 25. Calcium permanganate tank—hydrogen/permanganate steam generator for turbine is located behind this tank. 26. Oxygen distributor unit. 27. Alcohol pipes for subsidiary cooling. 28. Alcohol inlet to double wall of rocket motor. 29. Electro-hydraulic servo motors.

HERE AND THERE

Military Inauguration

THE U.S.A.A.F. is to fly the first American air services to Spain, and will carry fare-paying priority civilian passengers. Members of the W.A.C. will probably act as "hostesses."

Italians Flying Spitfires

BRITISH Spitfires are being flown by Italian pilots in Italian formations, said an Italian Air Ministry communique broadcast.

Italians are also flying Baltimore bombers and American P-39 fighter-bombers.

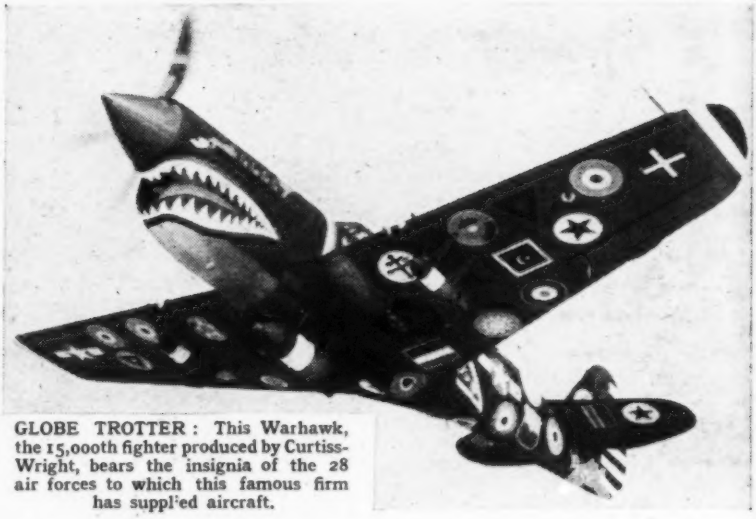
Big U.S. Rocket Programme

AMERICA will shortly spend $100,000,000 (about £25,000,000) a month on rocket ammunition alone, reported the U.S. Office of War Information, quoted recently by New York Radio.

The report says that rockets have been found very effective as cover for landing operations.

M.E. Appointment

IT was announced last week that Air Vice-Marshal Charles Stafford, who helped in planning the invasion of France, has been appointed Air Officer, Administration, at H.Q., Middle East, in succession to Air Vice-Marshal Betts, who returns to Britain.



GLOBE TROTTER: This Warhawk, the 15,000th fighter produced by Curtiss-Wright, bears the insignia of the 28 air forces to which this famous firm has supplied aircraft.

A. V.-M. Stafford will act as Deputy to Air Marshal Park, A.O.C.-in-C., Middle East.

Heavies' Atlantic Record

THREE Liberators of R.A.F. Transport Command last week knocked nearly two hours off the previous best time for the west-east Atlantic crossing by four-engined "heavies"; they covered the 3,150 miles from Montreal to a British airport in 10 hr. 31 min., carrying full loads.

No Future in It

MR. NORMAN BOWER (C., Harrow) asked the Prime Minister in the Commons recently whether he is satisfied that the Allies have adequate plans to prevent the Germans carrying out secret experiments in the further development of long-range weapons after the war?

Mr. Churchill: "I certainly think it ought to be well looked after. We have a lot of regular people on the job and so have our American and Allied friends."

Halifax's African Tour

A HALIFAX III (four Bristol Hercules), now on a tour of Rhodesia and South Africa, is the first of its type to visit the Union. The flight is partly propaganda, but also facilitates technical tests which are being carried out on the aircraft for M.A.P.

Keen interest is being shown in the Halifax by the people of South Africa, where the aircraft has been named *Sarie Marais*—the name of a legendary folk-song heroine.

Seeing for Himself

AFTER a four-day visit to New Zealanders serving with the 2nd Tactical Air Force in Holland, Belgium and France, the High Commissioner for New Zealand, Mr. W. J. Jordan, returned to London.

During his tour Mr. Jordan watched one Spitfire squadron take off for a dive-bombing attack on German lines of communication. He inspected scenes of fierce fighting in Holland, and also visited the Nazi concentration camp at Hertogenbosch.

Mr. Jordan was accompanied by Air Commodore E. G. Olson, commanding R.N.Z.A.F. Headquarters in Britain.

Victory Club Fund

APPEALS are now being made to the various branches of British industry on behalf of the £1,000,000 Victory Club Fund launched under the auspices of the Victory (ex-Services) Association. This has the support of the Admiralty, War Office, and Air Ministry, and the personal blessing of the Prime Minister.

Designs for the proposed new club, to be situated in the heart of London, are already being considered, and the actual building will begin as soon as possible after the war. Temporary accommodation has been found, meanwhile, adjoining the blitzed Allenby (Services) Club.

It will have at least 400 bedrooms for the use of ex-Service men and women, a first-class restaurant, bars, lounges, club rooms, a library and other amenities, and will be open to all ex-Service people

Air Marshal Sir Leslie Gossage, director-general A.T.C., with (left) Capt. K. J. G. Bartlett and (right) Mr. W. G. Verdon Smith, Bristol sales director and chairman respectively, examines a model of the "Freighter" (see "A.T.C. Calling," p. 633.)

HERE AND THERE

of the Empire and Allies, irrespective of rank, race, or religion. Employment, welfare, and advice bureaux will be administered by the Association in collaboration with the British Legion and other ex-Service Associations.

Speaking at a gathering of representatives of the aeronautical and motoring Press last week, Air Marshal Sir Bertine Sutton stressed the point that the project was in no sense a rival to existing funds and Associations, but was complementary to them.

In Bondage

A GERMAN V-1 flying bomb (slightly bent) which fell in "Southern England including the London area" was exhibited in Washington last week to encourage citizens to buy U.S. War Bonds.

"Never Heard of It"

AMERICAN soldiers who profess not to have heard about the V1 flying bomb have caused irritation to their German interrogators when they have been captured, according to German prisoners taken in the 7th Army sector.

The prisoners said that captured Americans were all asked by German interrogators, evidently for propaganda purposes, what they thought of the effects of V1.

Some of them stunned the interrogators by replying "Never heard of it," and one "Doughboy" queried blandly, "What is it?"

Glider Ambulance Pick-up

GLIDERS left over from the Wingate-Cochrane expeditions are being used to evacuate casualties from the central Burma front to base hospitals, using the pick-up method. Dakotas of the U.S.A.A.F. get sick and wounded men out in one hour as compared with the three-day trek over jungle roads.

The distance is about 100 miles, and the return trip is made two or more times a day, as many as 70 casualties having been "cleared" in 24 hours.

To Seek New Pastures

AIR VICE-MARSHAL D. C. T. BENNETT, of Pathfinder fame, and Air Marshal Sir William Welsh, until recently head of the R.A.F. delegation in Washington, are both reported to be planning to resign from the R.A.F. to take up posts in commercial aviation.

A. V.-M. Bennett is said to be joining the recently formed British Latin-American Airways "as soon as he can be released from the R.A.F.," while Sir William is going into what is the rival camp so far as the South Atlantic air route is concerned; he is to join B.O.A.C.

Another air chief reported to be contemplating a bowler hat is Air Marshal Sir John Slessor, who may take up an academic post at Oxford.

Nip Hopes

TOKYO radio spoke recently of the time when Japan "resumes a fierce offensive against the U.S. and commences overseas bombing."

A Japanese professor was quoted as saying that when this happened, Japanese aircraft will be equipped with their own radio instruments, which will be "equal if not superior to Radar."

"Family" Helicopter

A FOUR-PASSENGER "saloon" helicopter is to be mass-produced after the war, it is reported, by a new company organised by Mr. Vincent Bendix, former chairman of the Bendix Aviation Corporation.

The daily Press announcement of the projected Bendix helicopter says it will cost about a quarter as much again as a car (Austin Seven or Rolls-Bentley?) and that it will be "easier to operate than many cars."

Mercy Mission

K. E. PARMENTIER, one of K.L.M.'s most famous pilots, has returned to London to direct flights of planes to the liberated Netherlands carrying medicines and food for the relief of the population.

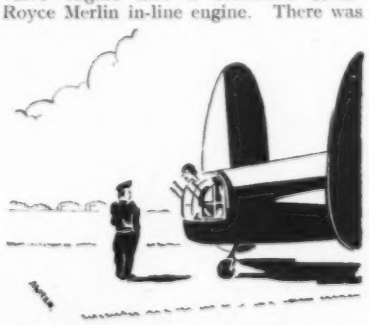
There are four Dakotas—two Dutch, two from SHAEF—now operating these flights.

Parmentier flew the DC-2 "Flying Hotel" in the Mildenhall-Melbourne air race, and has been flying for K.L.M. throughout the war.

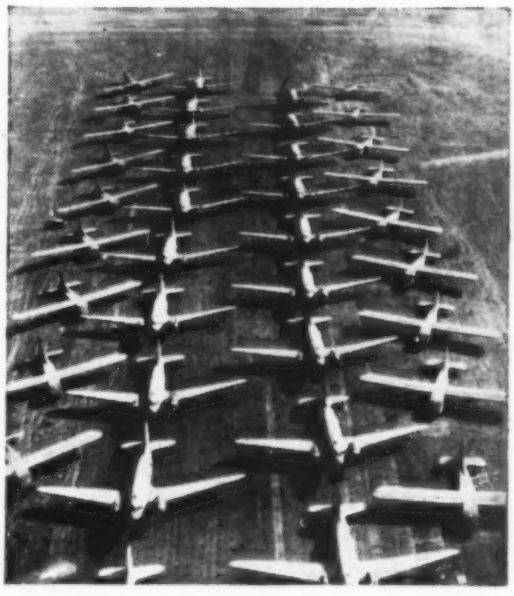
"A.T.C. Calling" at Bristol

ONE of the best aeronautical exhibitions of recent months has been the Bristol "A.T.C. Calling" exhibition, sponsored by the *Bristol Evening World*, and opened on November 25th by the Lord Mayor of Bristol and Air Marshal Sir Leslie Gossage, Director-General of the Air Training Corps.

In addition to the usual R.A.F. exhibits, such as the Link Trainer, which always attracts universal attention, especially interesting exhibits were put on by the Bristol Aeroplane Co. and Rolls-Royce, Ltd. These included a sectioned Bristol Hercules radial sleeve-valve engine and a sectioned Rolls-Royce Merlin in-line engine. There was also a display of scale models of all Bristol aircraft from the "Box-kite" of 1910 to the "Freighter" of 1944. A full-scale model of a flying bomb was also on show.



"I couldn't stand being cooped up in a tiny office."



THE AMERICAN WAY of lining up Dakotas with gliders for take-off differs from that of the R.A.F., in which the tugs "draw from the pack" as they taxi to the end of the runway.

A Month's Destruction

AIRCRAFT of the U.S. Ninth Air Force flew more than 15,500 sorties on 29 days in November, attacking more than 100 of the fortified towns and villages in the German defensive system east of Aachen, it has been officially announced.

During the month, 371 locomotives were knocked out and 83 damaged; 87 tanks were destroyed and 89 damaged; 1,167 railway cars destroyed and 1,631 damaged; 14 bridges destroyed and 26 damaged; 107 enemy aircraft destroyed and 51 damaged; and German railways were cut in 266 places.

Eleven bombers and 119 fighter-bombers were lost.

Pros and Cons

LORDS WINSTER and Brabazon expressed themselves on civil aviation at the Foyle luncheon at Claridge's recently in their renowned uncompromising manner.

The former said we were condemned to a "fairly bad start" in civil aviation, but then we always did make a bad start because we were a nation of improvisors, not planners. But, he went on, if our chief rival wanted a "free for all," we were quite capable of taking off our coats, rolling up our sleeves, and coming out on top.

Lord Brabazon said the enormous strides being made in the development of the jet engine—in which we were streets ahead of anyone else—meant that every big machine being made to-day here and in the U.S. would be "hopelessly out of date" by the time it was built.

D

HAMILCAR GLIDER . . . .

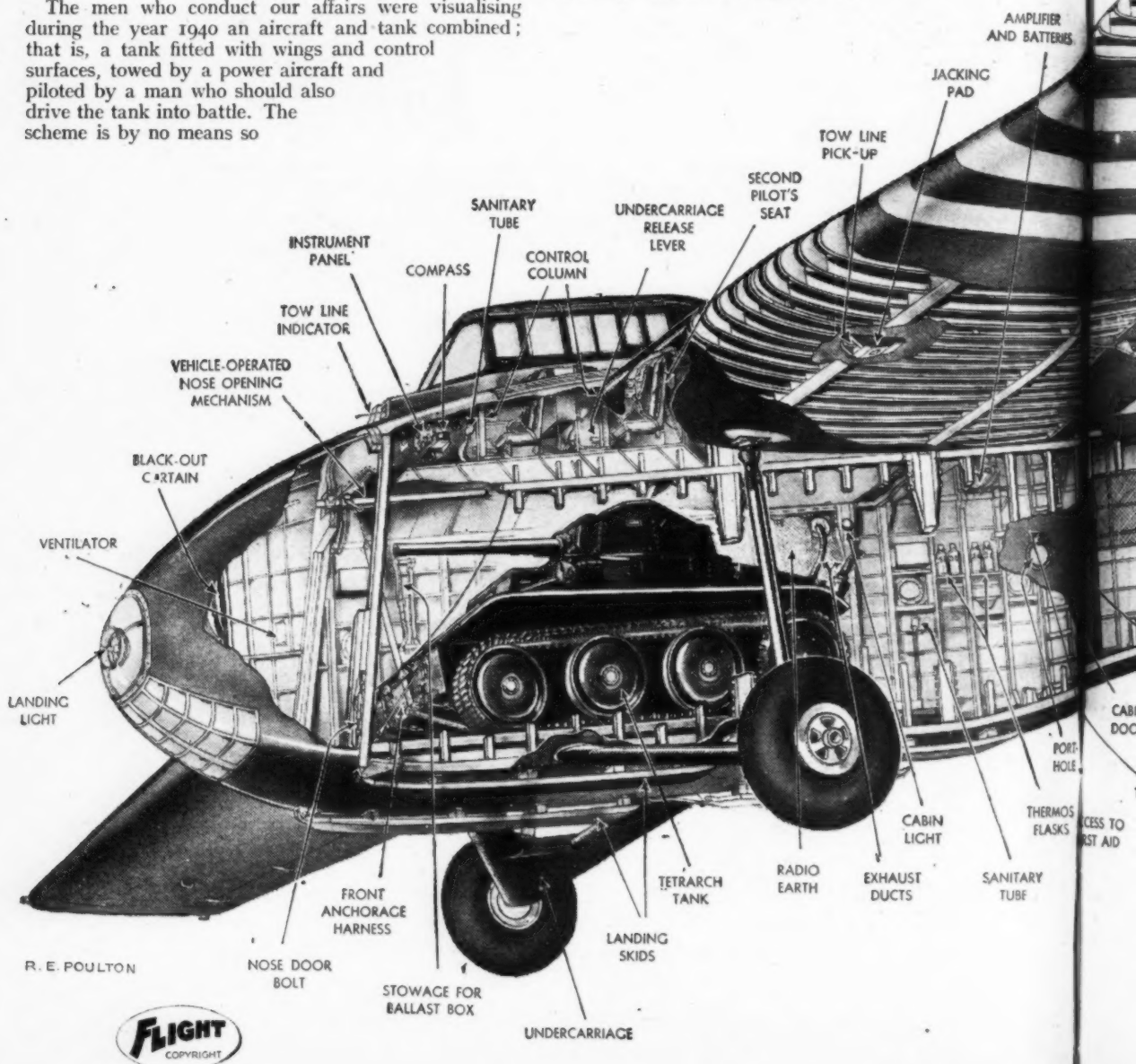
A Survey of the Mammoth British Tank-carrying Transport Glider

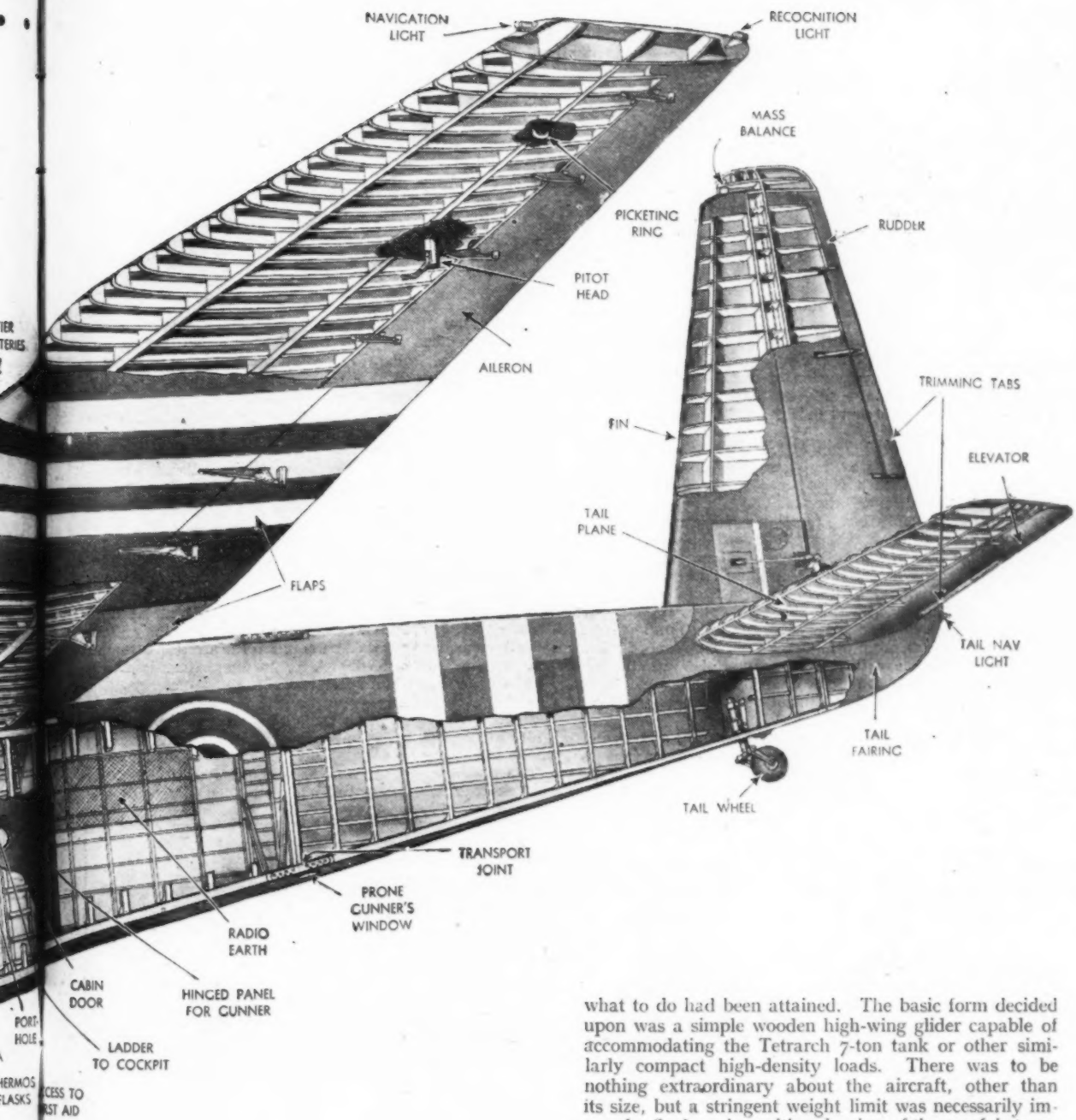
THE General Aircraft Hamilcar has a rather unorthodox history; unorthodox in that the original concept was such stuff as dreams are made of. During 1940 the authorities responsible for our prosecution of the war were looking clearly into the future with such uninhibited perception as appears farcical when applied to the stolid Englishman of fable. It must, however, be somewhat of a set-back to the facile critics of our unimaginative ways that so many of the amazing devices used to-day are the product of English imagination.

The men who conduct our affairs were visualising during the year 1940 an aircraft and tank combined; that is, a tank fitted with wings and control surfaces, towed by a power aircraft and piloted by a man who should also drive the tank into battle. The scheme is by no means so fantastic as appears at first sight, and practical interpretations of the idea were made and thoroughly investigated.

It was eventually clarified that to attain any reasonable degree of aerodynamic efficiency so much modification would have to be carried out on the already existing tank structure as to negative in large measure the possible advantages.

Thus, at the beginning of 1941 a great deal of "distilling" had been done, and in February concrete decisions on





This special " Flight " drawing by R. E. Poulton shows the main structural features of the Hamilcar together with the disposition of ancillary equipment. The engine of the tank is started during the final glide, so that it is ready to drive out after landing, and the exhaust is dispersed to atmosphere through the ducts shown. Although not normally intended for aerial action, the glider is provided with a floor panel which can be opened, and a hinged panel in the door to allow fire to be returned by crew personnel if attacked.

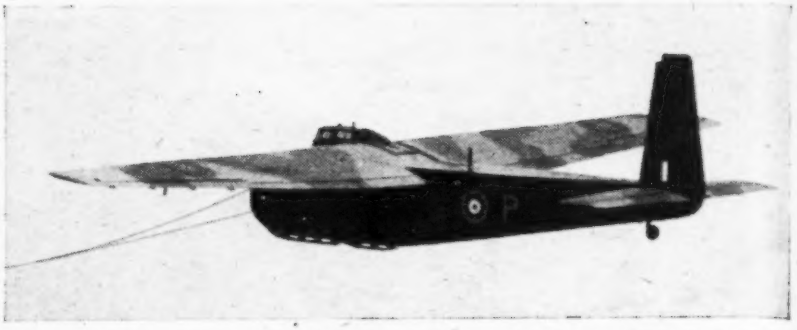
what to do had been attained. The basic form decided upon was a simple wooden high-wing glider capable of accommodating the Tetrarch 7-ton tank or other similarly compact high-density loads. There was to be nothing extraordinary about the aircraft, other than its size, but a stringent weight limit was necessarily imposed. Such an imposition, in view of the careful stressing consonant with a safety factor of five for the airframe in connection with the high-density loads envisaged, made necessary the use of high-grade stainless steel fittings at various crucial locations. To achieve the same strength with light-alloy would have incurred greater weight; and the designers of the Hamilcar are to be congratulated on having succeeded in producing the glider 800 lb. lighter than the weight condition laid down; this is particularly noteworthy when it is realised that the tare weight of the aircraft is only approxi-

HAMILCAR GLIDER

mately half of the maximum all-up weight.

The Hamilcar may be broken down into several major units as, indeed, it is broken down for transport purposes. Thus, the wing outer panels are pin-jointed at the spars to the outboard ends of the centre-section spars, and from the undersides of these the front (load-carrying) part of the fuselage is suspended, also by means of pin joints. The rear fuselage structure is relatively light and is, in fact, little more than a fairing to carry the tail surfaces and tail wheel.

Both pilots are enclosed in a "glass house" on top of the front fuselage and completely separated from the fuselage interior. The nose portion of the fuselage proper is hinged on the starboard side so that it can be swung open to facilitate entry and exit of the load carried.



On tow : Hamilcars are pulled by Halifax or Lancaster tugs and the tow line, as in the case of other large gliders, is bifurcated to pick up with quick-release hooks on the centre-section front spar.

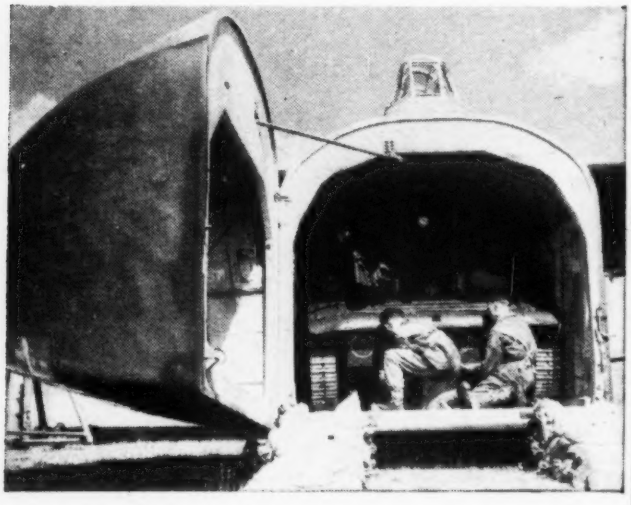
Undercarriage Evolution

At first the concept was that the glider should be flown off on operations with a very simple main undercarriage, which should be dropped after take-off, the machine landing on the skids beneath the fuselage. However, for ferrying purposes a different type of undercarriage was devised, this having oleo-pneumatic shock-absorber struts and a very wide track, whereas the operational landing gear was simply a beam spanning the undersurface of the fuselage and terminating in a wheel at each end. It was not intended that this gear should be used for landing but purely for take-off, after which it would be dropped; but landings *were* made with it and, somewhat naturally, the lack of shock-absorption made the bouncing on the tyres quite noticeable. Further difficulty was experienced in jettison; release each side was seldom exactly coincident and the wheels on their axle beam could drop and immediately bounce back to hit the machine. Experiments proved that the best way was to attach three standard stati-chutes to the undercarriage which had to be released at not less than 400 feet, whereupon it would fall reasonably slowly to earth.

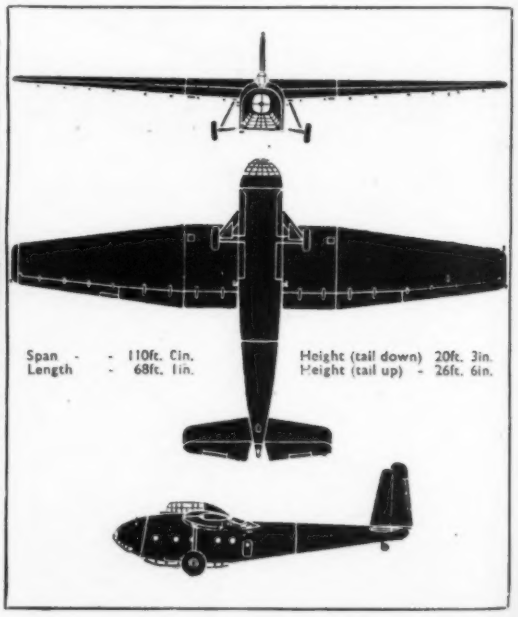
When operational landings came to be made, it was found by the Hamilcar pilots that putting-down on the skids allowed of no directional control on the ground, and consequently there was no means of avoiding crashing into the glider in front if that happened to have landed a little shorter than the following machine.

Experiments were then made with the ferrying type undercarriage, and it was found that operational landings could be made successfully with the glider brought to a stop by means of the wheel brakes, in a distance correspondingly favourably with that for a skid landing. Nevertheless, for loading and unloading, the glider had to rest on the skids, as only in such circumstances is the sill of the entrance doorway brought sufficiently low. This condition made it imperative that some means should be provided for so arranging the undercarriage that it could collapse as necessary to allow the fuselage to be lowered to the ground. By arranging that valves should open to deflate the oleo-pneumatic shock-absorber struts and so permit the collapse of the struts under the aircraft's weight, the problem was solved. After loading, the aircraft is lifted by means of two special 15-ton hydraulic jacks, one beneath each jacking point on the centre section front spar, and when jacked-up the undercarriage is fitted, the glider afterwards being lowered until it is finally standing on its landing gear.

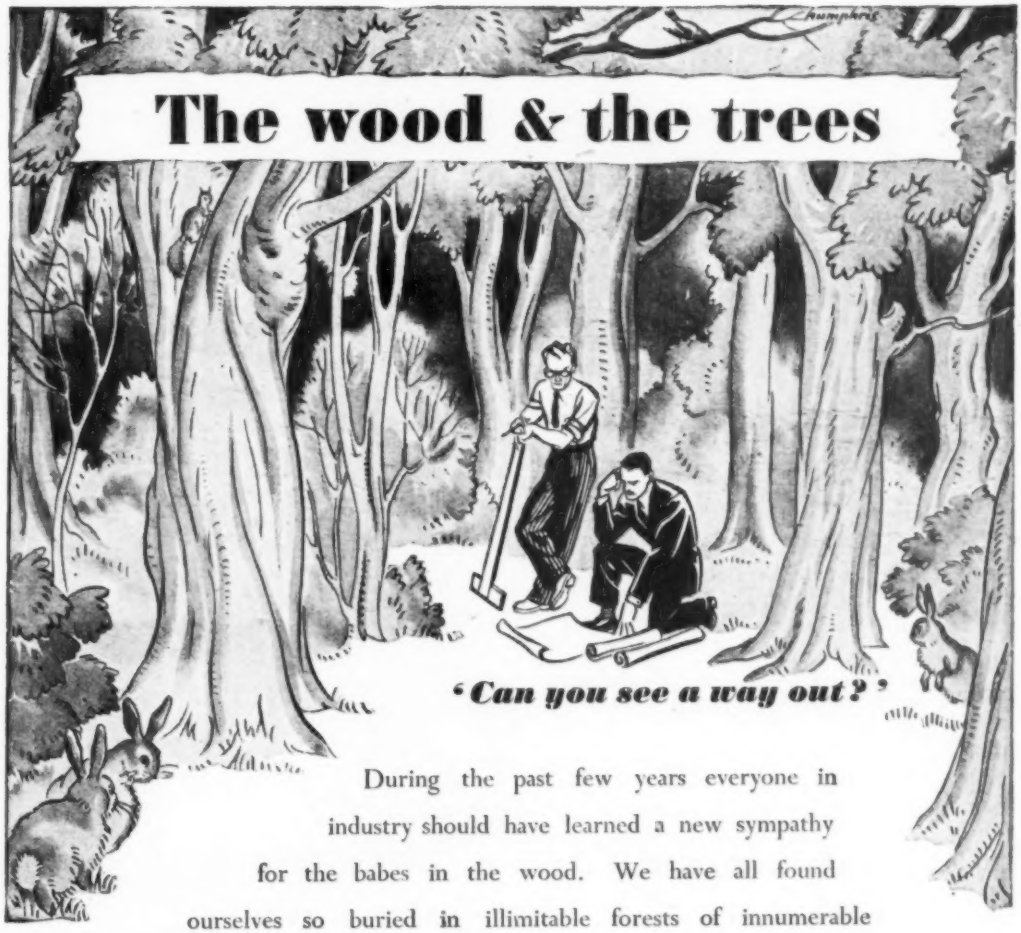
The undercarriage as now used consists of two built-up stainless-steel box-beams to each wheel, the foremost being



Loading a Tetrarch tank which is run up into the cabin on sand-bag ramps. For unloading, however, the tank just drives out over the metal-faced door sill.



The wood & the trees



'Can you see a way out?'

During the past few years everyone in industry should have learned a new sympathy for the babes in the wood. We have all found ourselves so buried in illimitable forests of innumerable trees that each of us must have wondered at times, if there really was a way out. At such depressing moments, many fine engineers have found it useful to get an outside view: *"Have a look at this, Simmonds. Can you see a way out?"* Sometimes we can. Not because we are more clever than the people we serve—but because we can more easily stand back from the problem. And, of course, because tackling the problems of one industry often helps in solving those of another.

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The supercharger clutch cone for the Napier Sabre Engine, which you see above, is a simple affair to look at, but the specification called for exceptional frictional properties; very exact dimensions and strength to resist the stresses involved in running at 25,000 revolutions per minute. Getting all three just right wasn't easy but it was the sort of job we like. We're prepared to look into any and every question which comes within the wide scope of our activities and even if our technical people generally greet every new problem by saying something like "Why give us all the tricky jobs?" — it's a fact that the more tricky the problem the more enthusiastic they become about finding the answer.

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a radius arm and the rearmost an axle beam. At the apex of the V made by these arms the stub axle proper is fitted, and between this point and the centre-section front spar is fitted the shock-absorber strut. All pick-up points on the undercarriage, i.e., anchorages to fuselage and each end of the shock-absorber strut, are ball joints; by such attachments the collapsing function of the undercarriage is allowed in addition to the normal operation.

The centre section consists essentially of two spars of box formation, around which the plywood skin is built up on simple ribs. Both spars are of similar construction, with laminated booms at top and bottom joined on both front and rear sides with plywood webs. There are, of course, stiffening diaphragms between the webs, and attachment posts on the front and rear surfaces to which the ribs pick up. As mentioned, all major attachment fittings are built-up stainless-steel units, and the outer wing panels are each attached to the centre section through four chordwise pin joints, one to each boom of both spars. On the front and rear faces of each boom are bolted spanwise stainless-steel laminations, which terminate as lugs—this applies both to centre-section and outer-wing spars—and the lugs of the outer-wing spars nest within the lugs of the centre-section spars, the massive pins securing the two together. Such a system allows of very easy assembly and dissembly, whilst at the same time ensuring a positive joint capable of high stressing.

Construction of the outer wing panels is similar to that of the centre section; the spars are of tapering section, but are similarly of top and bottom laminated booms, with fore and aft ply facing webs internally stiffened. Main ribs between spars and behind the rear spar have top and bottom booms curved to the aerofoil contour and joined by full ply webs strengthened by a bracing framework. Intermediate ribs are of separate top and bottom curved booms with no web or bracing framework whatsoever in their inter-spar portions, but with full ply webs and bracing to their trailing-edge lengths behind the rear spar. Nose ribs are built up in three arcuate segments and joined on their foremost part by a leading-edge nose-stringer.

Brackets for flap and aileron controls are mounted on the rear face of the rear spar, and two main ribs at inboard stations have extensions at their trailing edges carrying metal plates between which are located the flap-hinge blocks. Main ribs at outboard stations are similarly extended and equipped to take the four aileron hinges.

The slotted-type flaps are in two sections to each wing, the inboard flaps being carried on the centre-section trailing edge and the outboard flaps on the trailing edge of the outer wing panel. Inner and outer flaps are identical in construction, with single box-type spars, diaphragm ribs and plywood skin. Hinges and control brackets are mounted direct on the spar face.

Ailerons

Ailerons are of conventional slotted, back-set hinge type and, like the flaps, are built up round a single box spar to which are attached separate diaphragm-type nose and trailing-edge ribs. The two final outboard ribs of each aileron are extended forward and carry, bolted between them, the mass balance of lead discs which move in a recess formed in the wing trailing edge. Although the ailerons are nominally fabric-covered, plywood skin is fitted to the nose portions, with local extensions to the trailing edges at hinge stations in order to afford continuity of torsional stiffness. A trimming tab is fitted at the inboard end of the starboard aileron, trim compensation between ailerons being effected by the control balance cable.

In considering the fuselage, one's attention is immediately directed to the main load-carrying portion and the way in which it is suspended from the centre section. However, for the sake of clarity the best purpose might be served by conducting the survey progressively from nose to tail.

Basically, the fuselage is square in section and of semi-monocoque construction, comprising plywood covering over a framework of vertical square frames with corner longerons, the whole being strengthened by intercostal stringers.

Fuselage Structure

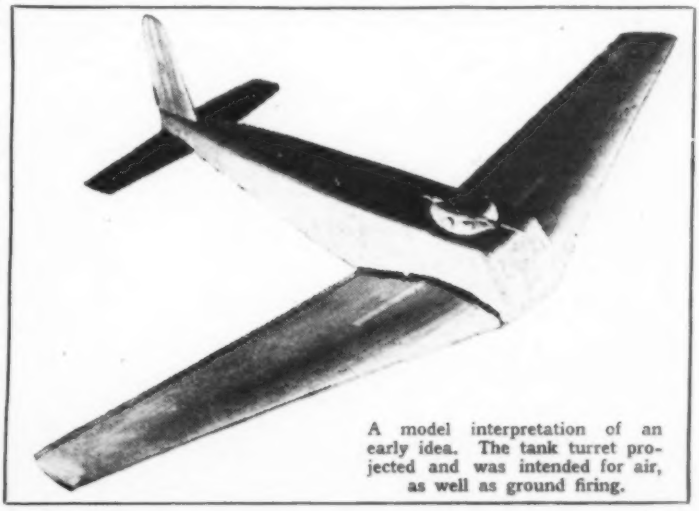
The nose door is built up with alternate light and medium laminated frames attached to laminated curved longerons terminating at the rear in a massive built-up frame which rakes backward at an angle of 8 deg. Covering is plywood, supported on light stringers attached to the frames with small flexoply gussets, but the forward part of the undersurface and the extreme nose portion of the structure is surfaced with transparent aceti-cellulose panels which admit light to the cabin (a very important psychological factor for the tank crew) and also provide a limited downward and forward view. Hingeing for the door is on the starboard side, and the spigot for the locking mechanism is to port. This locking device is mounted on the front of the first frame of the fuselage proper. It can be operated manually both from inside and outside the machine or, alternatively, can be operated automatically by the initial unloading movement of the vehicle in the cabin.

This feature is rather ingenious and applies also to the opening of the door. Fitted in the top starboard portion of the door is a cable-operated push-rod assembly which can be actuated manually, or by a cable led vertically over the front of the tank and attached at its bottom end to the floor. Thus, as the vehicle starts to move forward, the cable, being tightened, pulls forward the rod attached to the door and so pushes it open. As the tank moves farther forward the upper end of the cable, which terminates in a ferrule located over a nib on the shaft, is pulled to a vertical angle and so allows the ferrule to leave the nib, the cable falling away freely.

The front fuselage structure is open at the top, that is, there are no spanning top members to the frame as far back as the centre-section rear spar attachment points. From the nose door to the front portion of the centre section the upper part of the fuselage above the longerons is occupied by the structure incorporating the pilots' cockpit. This is a separate built-up unit consisting of an open-topped trough, forming the seating well of the cockpit itself, supported on three main transverse trusses, one at each end and one in the centre. Between the trusses, longitudinal beams support the cockpit floor and also serve as mounting members for the primary flying controls. The sides of the cockpit trough are of ply, and the "glass house" hooding is mounted on a built-up superstructure surrounding the trough. The remainder of the top fuselage structure is made up of light former frames and stringers, the whole being covered with ply.

Naturally enough, the framework of the front fuselage struc-

GENERAL AIRCRAFT HAMILCAR GLIDER	
Span	110ft. 0in.
Area	1,047.5 sq. ft.
Aspect ratio	11.5
Wing loading (maximum)	34.3 lb sq. ft.
Wing section ...	R.A.F. 34 modified
Chord—at root ...	18ft. 6in.
Chord—at tip ...	8ft. 9in.
Ground angle ...	8 deg.
Fuselage width ...	9ft. 3in.
Tailplane span ...	32ft. 6in.
Tailplane area ...	250.2 sq. ft.
Tailplane section ...	R.A.F. 30 (symmetrical)



A model interpretation of an early idea. The tank turret projected and was intended for air, as well as ground firing.

HAMILCAR GLIDER

ture is rather hefty; it must of necessity be so to carry the large and concentrated loads for which the Hamilcar was conceived. The side and bottom members of these heavy frames are joined with high-tensile steel gusset plates on each side bolted through, and the upper part of the vertical side members are fixed to the longerons by means of gusset plates. Two very large laminated frames transmit the lift forces from centre-section spars to the fuselage, and each of the side members is connected to the bottom spanning members by what may perhaps legitimately be called a "fixed mechanism." This consists of a gusset plate and two transmission members to each side of each vertical and horizontal frame member, the whole being through-bolted. The effect is that loading motion in the frames is confined to stress distribution along vertical and horizontal paths, i.e., along the lengths of the respective frame members. At the heads of these two frames (the foremost of which is the larger) are fitted the stainless steel lugs which register with the suspension pick-up lugs on the centre-section spars, the actual joint being effected by means of pins with double-eccentric bushes to facilitate assembly.

Over the spanning bottom frame members in the front portion of the fuselage are fitted the vehicle rails, which can be adjusted against stops on the frame members to suit the tracks of different vehicles.

A massive spine beam passes through the bottom frame members between the front and rear suspension frames, and is attached to these members by heavy metal angle fittings. This spine is the vehicle's - main - anchorage - beam and carries a pulley assembly which constitutes part of the main anchorage system. It is, of course, virtually impossible to arrange separate anchoring cables so that the load on each is identical, and to get over this the vehicles are anchored by a single cable, both ends of which are attached to the front of the vehicle and the centre part carried round the free pulley. As most of the anchorage-load forces are forward and downward, as in gliding to land and decelerating after touch-down, the main anchorage attachment to the load is always in the front, and the rear anchorage is relatively much lighter as it is subject to far smaller stresses. Anchorage arrangements are probably the most important single factor in the operational use of the Hamilcar, but as every individual load has its own anchoring or lashing system, it is virtually impossible to deal with the subject under these conditions. Suffice it to say that the Tetrarch tank is anchored by means of the single cable arrangement mentioned, the cable ends terminating in a frame carried on lugs projecting from the forepart of the tank body. From this frame a lanyard is carried up within reach of the tank driver. After landing, he pulls this, so extracting the locking pins attaching the frame to the tank, which can then be driven forward, the initial forward motion automatically releasing the spring-yoke rear anchorages and, as we have already seen, also unlocking and opening the nose door.

At the joint between the side and bottom frame members run the lower longerons, these being rather larger in size than the top ones, and to the lower longerons and frame members are attached the landing skids and also the stainless-steel anchorages for the undercarriage structure.

The top longerons of the forepart of the fuselage run back a few frames aft of the centre-section location, and the top longerons of that part of the fuselage from the centre-section rearwards thus overlap by some few feet. Aft of the rear suspension frame the general structure of the fuselage is lighter, the frame members being joined by wood gusset plates, and the scantlings being not nearly so hefty as those in the actual load-carrying part.

On the port side are located the high and low pressure air bottles which supply the flap-actuating servo mechanism mounted on the rear face of the centre-section rear spar, and also supply the undercarriage wheel brakes. Rearward of the air bottles is the side entrance door, and opposite this, on the starboard side of the fuselage, is the ladder leading up to the roof hatch through which the pilots obtain access to their cockpit.

The rear fuselage extends from the transport joint, about half-way along the fuselage length, to the small fairing at the extreme tail, and is square in section, tapering towards the rear. Structurally, it consists of light rectangular frames attached to the longerons by gussets, with intercostal stringers supporting the plywood skin. Attachment between the front and rear fuselage assemblies at the transport joint is by means of strap plates and bolts at the longerons, and bolts between the abutting transport frames. At the rear end, two heavy built-up frames, covered both sides with ply, completely fill the section. The foremost of these carries at the top the attachment plates for the front post or spar of the fin, and for the front tailplane-spar; below these in the centre is carried the mounting for the tail-wheel, and at the lower corners the rearward towing attachments. The second of these frames carries the rear fin-post attachment, the elevator relay unit and the tail-fairing attachment brackets. The tail fairing itself is a ply-covered structure of curved corner members, light frames and stringers, and is secured to the attachment brackets already mentioned with 2 B.A. bolts and anchor nuts.

HAMILCAR LOADS

The various loads carried by the Hamilcar are listed below with, where possible, their total weight (in lb.) which includes the weight of the accompanying crews.

	Total
1 Tetrarch Mk. VII tank ...	15,680
1 Locust tank (U.S.A.) ...	—
2 Universal carriers ...	17,000
3 Tank trailers with 4 Airborne supply panniers ...	—
1 Mortar carrier (9,280 lb.) with 8 motor cycles (2,880 lb.)	12,160
1 Slave battery carrier with 1 jeep	—
1 Small type Bulldozer ...	15,920
1 17-pounder anti-tank gun with 1 gun haulage-truck	—
1 Scraper with equipment plus 1 tractor for hauling scraper	—
1 Grader with 9 Airborne supply panniers	—
2 Daimler Scout cars ...	—
1 Self-propelled Bofors gun	—

Tail Unit

Although the rudder and elevator are fabric-covered units, both the fin and tailplane are ply-covered. The fin is a two-post, or two-spar, structure, each post being a box of spruce booms and ply webs with internal stiffening diaphragms at rib stations. Ribs are of diaphragm type, with separate nose and centre portions, and are made up with spruce booms and ply webs; glued to the open side of the webs are vertical stiffeners gusseted at the corners to the rib booms. Attachment of ribs to fin posts is normally by glueing and screwing at the rib locating strips, but at rudder-hinge stations by metal angles bolted to the post. The front fin post is raked back at an angle of 6½ deg., and, as we have seen, is attached to the top of the foremost of the two built-up tail-fuselage frames; the rear fin-post, however, extends the full depth of the fuselage and is attached to the rear frame by bolts with double eccentric bushes which allow of correct alignment being obtained in assembly.

The rudder is built round a single box post of similar construction to the fin posts, with ply covering to the leading edge and over the bays in way of the hinges. Rib construction is similar to that described for the fin, but the central three-fifths of the trailing edge incorporates a sub-spar on which are mounted the hinge brackets for the trimming tab. The horn balance at the top of the rudder also contains the mass-balance weight and is covered with a mounded composition skin screwed to the framework.

Construction of the tailplane is on similar lines to that described for the fin, but the front spar is in two sections, each of which is attached to the foremost of the built-up fuselage tail frames, whilst the rear spar is in one piece throughout the tailplane span and carries the six hinges on which the elevator pivots. Tips are of moulded composition screwed to the framework.

(*Continued on p.* 646)

The Hamilcar's size is very impressive.

BRITAIN TO THE FORE!

A British invention *led to the development of the Rotol Constant Speed Propeller which acclaimed its first success on the World's Long Distance Record Flight to Australia in 1938.*

Now following further outstanding successes with Frontline Aircraft—surely the greatest compliment that ever a Propeller has received is contained in the brief announcement from the Ministry of Aircraft Production who state:—

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R.A. 176

Glass-lined Cabins

New "Blanket Insulation" for Curtiss Commando : Weight Only 185 Pounds per Machine

THE Curtiss-Wright Corporation announces a new development in thermal insulation, achieved by their engineers at the St. Louis works of the corporation's aircraft division in conjunction with the Owens-Corning Fiberglass Corporation of Toledo, Ohio. The material used for reducing temperature transfer through the walls of an aircraft cabin is a "blanket" made of glass fibres set in a synthetic resin. Woven from glass threads only 0.0002in. thick the "blanket" can be made in any desired thickness. For the Curtiss Commando the thickness is half an inch and, with the resin used for setting, the weight is only 1 oz. per sq. ft. For an aircraft like the Commando, which has a cargo compartment of about 2,300 cu. ft. capacity, the weight of the insulation is only 185 lb., which represents a weight-saving of some 200 lb. compared with the material previously used. It is pointed out that this saving alone, stepped up to 1,000 aircraft flights over the Himalayan "Hump" into China, means an extra 200,000 lb. of war material, ammunition, fuel for the Superfortresses, food, medical supplies, guns, jeeps or repair parts.

In addition to its light weight, the new material has other advantages. For example, it is so pliable that it can be fitted over any shape, including windows, air ducts, control boxes, corners, and electrical outlets. Being chemically inert, the material does not cause corrosion of metals, and will not support any kind of fungus growth. It is also non-inflammable, and the combination of glass and resin has been found to have very low moisture absorption. Lengthy tests carried out in the laboratory showed that when subjected to tropical heat and humidity, the increase in weight due to moisture absorption was only 1 per cent., compared with something like 190 per cent. for kapok. The advantage of this will be obvious when it is recalled that the insulating material is in contact with the metal walls of the cabin, where condensation of moisture caused by differences between inside and outside temperatures is greatest. Yet another advantage is that, owing to the thinness of the glass threads, the material does not disintegrate under vibration.

The resin-set glass material is also quite effective for soundproofing. The half-inch thickness used in the Commando, plus the aluminium-finish trim cloth by means of which it is installed, was found to give a sound attenuation of 63 decibels. In the Commando a thicker "blanket" has been used in the pilots' compartment. This is one inch thick, and has been found to make the cabin very quiet, a very important factor in reducing fatigue on long flights.

No Tools Required

Ease of installation is another advantage of the new material. The blanket is attached to the aircraft structure by snap fasteners, so that it can be put into place or removed in an instant. If, for example, a machine is variously used for transporting cargo and troops or casualties, the material can be removed and reinstalled very quickly. The complete insulating equipment for an aircraft can be rolled into compact bundles and sent to centres and stations for installation. No tools are required, and the necessary instructions are simplicity itself.

The new blanket material will be used in the Curtiss CW-20 post-war version of the Commando. This machine will carry 36 passengers and will be powered by two Wright Cyclone engines driving Curtiss electric airscrews. Two major U.S. airlines have planned for the inclusion of CW-20s in their post-war operations. It will be possible to keep the cabin temperature at a comfortable level even when the outside temperature is 40 deg. F. below zero.

INSIDE A COMMANDO : The walls are lined with Fiberglass "blankets" made of very thin glass threads set in a synthetic resin ¼in. thick. The weight of the material is only 1 oz. per sq. ft.

RELEASE OF LIGHT METALS

FOR the first four years of war, the use of aluminium and magnesium had to be restricted almost entirely to military applications, predominantly aircraft. Even for this purpose, substitutes had largely to be adopted to conserve supplies. During the past year it has been possible to make them freely available for other military purposes while still meeting the needs of the aircraft programme.

The stage has now been reached where light metals can once more be released to manufacturers for civilian production, subject, of course, to their labour and capacity not being required for more urgent and important purposes. Light metals are also available for work on prototypes to form the basis for subsequent bulk production and for samples required in preparation for reopening markets for established uses.

Manufacturers can also now apply for release of material to build up working stocks in advance, against the time when machine tools, space and labour will become available for peacetime activities.

"Indicator" Discusses Topics of the Day

The Proof of the Pudding

Making Our Air Transport Market : Concentrating on Essentials : The Paramount Importance of Safety : To-day's Artificial "Come and Get It" Conditions : False Expectations

WHEN all the air transport talks are over, and the various nations have decided exactly who is going to have the major operating rights over this or that particular route, then the real work will start and only afterwards will the real decisions be made. Short of absolute monopolies in particular areas and over particular countries, the operating concern which will obtain all the business in the long run will be that which has transported its passengers and goods with the least ground delay, at the greatest reasonable speed, and, most important of all, with the maximum safety.

Some time ago I suggested rather pointedly in one of these articles that this country's aircraft manufacturers must "make" their own markets, and that these markets were, in fact, waiting to be "made." Within certain initial limitations imposed by any agreements, the same suggestion applies to air transport goods and passenger "markets."

However poor or however rich each of the different operators may be, the winner on a particular route will be the one to offer what is wanted—and the primary needs are reliability and safety rather than speed, sheer size, or even extreme comfort. Of course, the company with a monopoly on any route can kill as many passengers as it pleases and can run its services as raggedly as its contracts will permit, but it will eventually lose all custom to road, rail, or sea transport. Even the most modern-minded passenger prefers to lose a few days of his time rather than risk the loss of the rest of his span of life.

Safe Crews and Equipment

So, if in this country we find that we cannot always quite compete in matters of size and speed and cheapness—at least for the first few post-war years—then let us concentrate on a few of the things we really *can* provide. Our radio and instrument technicians have proved themselves to be second to none in the world: let us offer the most perfect series of safety devices to the operating crews—and tell the prospective passengers all about these devices. We already have some of the most experienced pilots in the world, and our racial characteristics make us good, "natural" aircraft captains, so there is no excuse for employing any but the most competent pilots on any service, and at whatever cost in training and experience in the second pilot's seats: so let there never be any accident which can reasonably be attributed to an error of judgment or to inexperience. It costs very little more to make safe aircraft—even at a small price in relative performance—and no more to hire "officials" (horrid word) who are pleasant to passengers and personally interested in them; so let us offer a "personal" service.

By such means our airlines can be made the safest and smoothest in the world, as well as the most friendly and intimate. Air travel cannot, by its very nature, offer the sort of flamboyant film-set comfort obtainable in the luxury sea-going liner, but it *can* offer the personal touch which is often so much more important than mass-produced body-comfort.

It will be many years before air travel can offer quite the standard of absolute safety and stop-watch regularity obtainable without much effort in other means of transport, but the operator who has the best record over a number of years will be the one to whom, if there is any choice in the matter, the passengers will flock. The ordinary traveller can forgive a cancellation but can never forgive a crash, and the casually interested prospective traveller may never hear of the cancellations, but will most certainly hear, gruesomely and at great length, about the accidents. Even a cancellation need not be a very great hardship to anyone if it is decided upon in good time and if the passengers are told exactly why the service isn't running and are given every facility to make use of other means of transport if these are available and if they wish to make use of the availability. In that, the airline operators who are hand-in-glove, or even merged, with the operators of other means of transport will have the advantage, since inter-availability of tickets will be more easily planned.

Unreal Conditions

The artificial travel conditions prevailing during a war must not be allowed to give operators or prospective operators any false ideas of the importance or "essentialness" of air travel or of the general reasonableness of passengers. Just now, with everything at sixes and sevens, it is so much easier and more convenient to go almost anywhere by air. So passengers, both official and semi-official, accept delays and discomforts without complaint, knowing these to be inevitable and quite absurdly unimportant when compared with the greater delays and discomforts which would have to be borne in wartime surface travelling. Maybe these conditions will continue to apply for quite a few years after the end of the European and Far Eastern wars, and the airline people can expect something of a boom during the transition period and while quite a large area of the earth is being heavily policed.

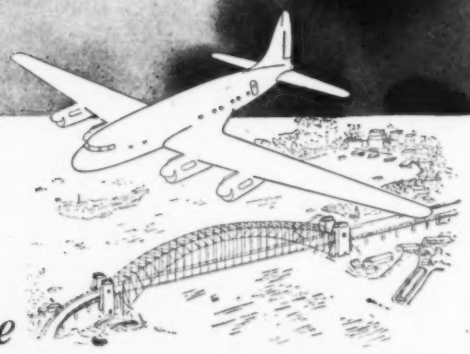
But eventually air travel will need to compete on rather more level terms with other transport systems. Then there will be seen the fruits of good salesmanship and service. The company with the best record of safety and reliability will take what is left of the "market." However keen we may all be on flying, either from the practical or technical point of view, let us not be blinded to the fact that it must offer a very great deal more than mere speed at any price. Only a comparatively small number of people, and even these only at irregular intervals, find time so very valuable that they are prepared to spend large sums of money, and to accept risks and discomforts, in order to save it. The great mass of travellers—yes, even thoroughly "air-minded" and enthusiastic flying people—will fly only if the total discomforts are less than those suffered in other means of travel, and if the risks are very little, if any, greater. Such conditions apply to people who hate the bothers attendant on normal travel, and who enjoy the peace and luxury of mental ease.

Persuading the Passenger

At the moment there is just a trace of a tendency for the sponsors of airline projects to say, in effect: "This is air travel; take it or leave it"—just as if there were something special and magic and intrinsically marvellous about air travel as such. Of course, this may be a good "line" in a new form of publicity in which the traveller is bullied rather than cajoled into the waiting aircraft, and in which the general public is mesmerised into thinking that there simply *is* no other means of reasonable and up-to-date travel for modern people. I don't think that people are so easily bullied or mesmerised, and, in any case, when the great mass of people are climbing into their hundred-tonners it may suddenly become fashionable to travel by train and boat—". . . so delightfully quaint, my dear."

And I wish we could somehow prevent enthusiastic

SINKING OF THE TIRPITZ.—Lancasters of Bomber Command scored their most spectacular success on Sunday, November 12, 1944, when 29 of them, carrying 12,000 lb. bombs, attacked the Tirpitz at Tromsö Fiord.



They 'take the strain' in War
– they'll carry the load in Peace

SUPERPLANES BY AVRO

A. V. ROE & CO., LIMITED
BRANCH OF HAWKER SIDDELEY AIRCRAFT CO. LTD

THE PROOF OF THE PUDDING

writers and speakers from laying on this "New York in ten hours" nonsense. Apart from the fact that it is difficult to see why anyone should actually want to be in New York, or anywhere else, in a couple of hours, it is going to be so disappointing to the passengers to find that the journey is still taking ten hours or more even in 1954. If we are propelled by jet or rocket at 50,000ft.—or out of the atmosphere altogether—the air must still be cleaved, the more rarified the air the slower the speed of sound, and the slower the speed of sound the more astounding will be the compressibility effects. We are only just beginning to learn something of these effects which, for better or worse, may alter all our ideas of design. So far as stratospheric travel at super-sonic speeds is concerned we are just about starting where Hiram Maxim and the Wright Brothers left off.

So let us stop thinking about A.D. 1999 and concentrate rather on the design and production of safe, simple, comfortable and only reasonably fast motor or jet-propelled aircraft which, with the help of modern radio aids, first-class crews, good maintenance, and impeccable ground organisation, will carry goods and passengers day in and day out to their correct destinations and reasonably in accordance with a set time-table. In the meantime, experimental departments and their test pilots can find out what this compressibility business means. "INDICATOR."

Glider Transport

Surface Only "Scratched" Yet : Divisional Commander's Enthusiasm

THE Hamilcar was essential—not merely important but essential—to the success of the invasion." That was how Major-General R. N. Gale, D.S.O., O.B.E., M.C., who commands the Sixth Airborne Division, summed-up the part played in the invasion by General Aircraft's Hamilcar glider, described in detail elsewhere in this issue. The occasion was the Press visit to the works of General Aircraft, Ltd., to see a demonstration of this amazing flying machine. The General explained that when preparations were being made for D-day, and he had to lay his plans for the share of his division in the show, it soon became obvious that anti-tank weapons would play an important, even a vital, part. How to get them to the allocated sector was the question. Speed was the important factor, and there was obviously only one way: by air. The Horsa glider was all very well in its way, but the load it would carry was too small to take the 17-pounder anti-tank gun. The Hamilcar came to the rescue.

They had, he said, seen a demonstration that morning of how impressive the landing of a large Hamilcar was. Multiply that by a hundred or more, and one got an idea of what a real large-scale glider-landing looked like. His division took and held a sector (for about two months, we believe.—ED.) which was vital to the whole operation, and they could not have done it without the 17-pounders landed by Hamilcar gliders. General Gale paid a very warm tribute to the glider pilots, whose skill, he said, was beyond all praise. He was all in favour of the large glider, the larger the better. Training the crew took a long time, and obviously it was better to carry 7½ tons with a crew of two pilots than only to carry three tons with the same crew. As for the future, he saw it as limitless. We had only just begun to scratch the surface of the possibilities of airborne forces.

The demonstration to which General Gale referred was indeed an impressive one. A Handley Page Halifax towing a Hamilcar arrived over the airfield exactly at the appointed time, made two very low circuits for the benefit of the Press photographers, then climbed and cast off the tow rope. The glider made its approach, the flaps being lowered at just the right moment, the machine touched-down as light as a feather and came to stop in front of the photographers. The nose swung away and, after a bit of hectic hammer work by the tank crew on some obstreperous shackle, out rolled a Bren-gun carrier. In the meantime the Halifax had returned and dropped the tow rope, then disappeared in the direction whence it came.

The sheer perfection of the demonstration was explained later, when it became known that the Halifax was piloted by Tim Woods and the Hamilcar by John Rodgers.

At lunch afterwards Air Comdre. Sir Maurice Bonham-Carter, chairman of General Aircraft, paid a tribute to those who had been responsible for getting the Hamilcar out in record time—less than 12 months from the start of work to the first test flight, and then subsequent production almost without modifications. Credit was given to Mr. F. F. Crocombe and his chief assistant, Mr. Leathers; to Mr. Williams, works manager, and also to Mr. E. C. Gordon-England who, at that time, was managing director of the firm. Not only had they got out the machine in a very short time, but they succeeded in saving 800 lb. on the original estimates of structural weight.

In wartime, Sir Maurice continued, everything, even ease of production, had to give way to the demand for performance. In peacetime the picture was reversed and ease of production became a very important feature. He was confident that General Aircraft would do its share in that direction also.

A TASK COMPLETED

LONDON AIR TRANSPORT, a group formed by five companies to build Halifax bombers, has completed its task and is changing over to other work in the spring of next year. This was announced last week by Lord Ashfield, chairman of the London Passenger Transport Board, at a Press reception. L.A.P. was formed in 1940 at the request of the Ministry of Aircraft Production and, we believe, on the suggestion of Sir F. Handley Page. It comprised Chrysler Motors, Ltd., Duple Bodies and Motors, Ltd., Express Motor and Body Works, Ltd., Park Royal Coachworks, Ltd., and the London Passenger Transport Board.

Lord Ashfield expressed his pleasure at having been associated with this undertaking, and his regret at having to bring it to an end. The achievement was, indeed, a splendid one, for none of the companies had any previous experience of aircraft work; yet, in spite of this, from its formation in 1940, starting from scratch, the first group-built Halifax flew towards the end of 1941. All that Lord Ashfield was permitted to say was that to date the group has built "several hundreds." It is difficult to see what comfort the enemy could have derived from being told the actual number, especially as the group is nearing the end of its production.

The task of building the Halifax was split up as follows: Chryslers built the rear fuselage portion; Park Royal made the outer wings; Express the intermediate wings; Duples the shell and components for the front fuselage portion, and London Transport undertook the manufacture of the centre section, the installation of the fittings and equipment for the front fuselage, the installation of the engines and the final erection and test flights. The latter were made from an airfield specially set aside for the group.

SHIPFINDERS

Concerted Night Attacks on Enemy Convoys and E-boats: Impressions of an Attack in a Torpedo-Beaufighter

By JOHN YOXALL

THIS is flying *par excellence*. Anyone who flies knows how difficult it is to get perfect co-ordination in a daylight air operation, and yet these Shipfinder and strike squadrons work together at night and achieve split-second timing. The plan is essentially simple. A Wellington of a Shipfinder squadron goes out on reconnaissance. The enemy coasts are its chief hunting grounds. If a convoy or a pack of E-boats is spotted then a strike of Beaufighters immediately sets forth to the attack. Some will carry torpedoes and the others will be armed with rocket projectiles.

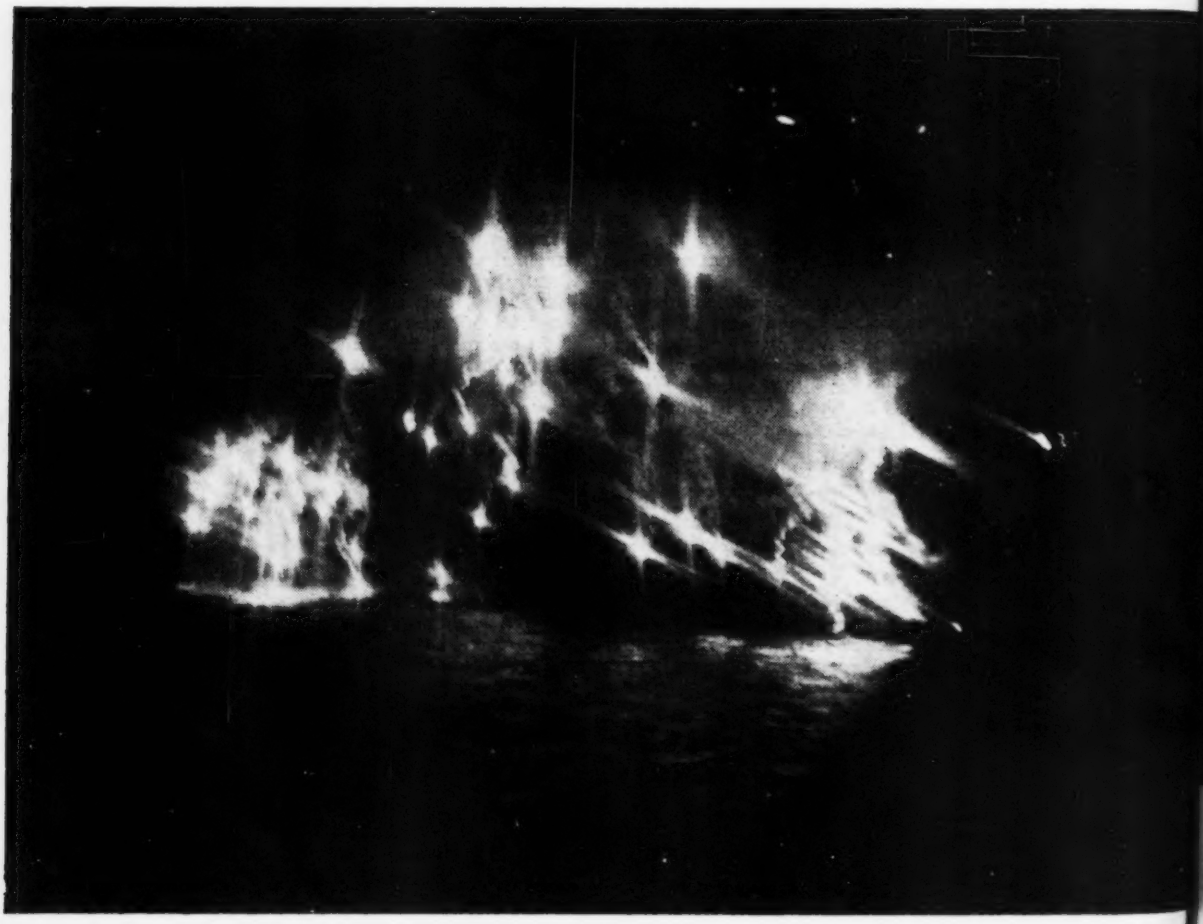
As the Beaufighters approach, the reconnaissance aircraft drops a white flare, known in the Service as a drip. The Shipfinder then leads the way to the enemy ships and drops a number of target indicators to provide the necessary illumination. These flares can be fused to go off at any height, and when they burst they throw out a number of high-candle-power orange-coloured lights which are supported by parachutes. The heat rising from them causes an upward current of air and the rate of descent of the flares is, therefore, very slow. A single stick of target indicators will last from three to four minutes. Two sticks are usually ample for the complete attack to be made.

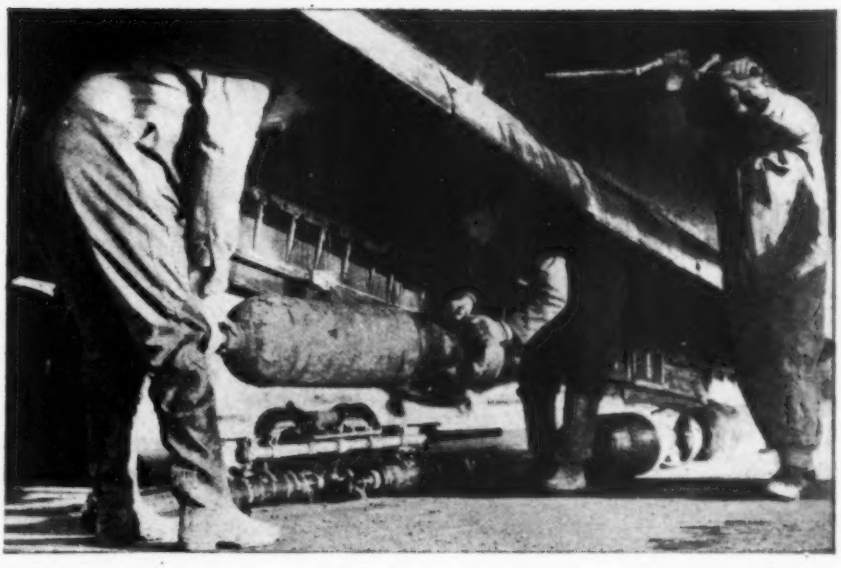
The Shipfinder Wellingtons also do some of their own striking. Their bomb bays are loaded partly with bombs and partly with flares, and they attack by the light of their own flares. The bombs carried have special fuses and the blast from a near miss is sufficient to blow a small ship completely over on its back.

Ops are Off

On the night that I visited a station from which these Shipfinders and Beaufighters operate, there was a bitterly cold north-west wind blowing at over 40 knots. It was, therefore, not surprising that the Germans were not operating any shipping close to a lee shore in such weather. Since there was not the real thing to be done, a practice attack was laid on against one of our own convoys in the North Sea. To get a close-up view of the proceedings I flew with Wing Cdr. Hutton, D.F.C., A.F.C., in a Torpedo-Beaufighter.

In the small hours of the morning I was duly awakened and never before have a few army blankets appeared so attractive. The enthusiasm of the night before is difficult to maintain as one tries to shave in super-cooled water and with no mirror. However, at the proper time I put in an appearance at the aircrew mess and enjoyed an operational breakfast of fried egg, bacon and chips. There must have been some cheating over the egg ration, because an emphatic notice on the wall read: "The Latest





LIGHT LOADING : Bombing-up a Shipfinder Wellington with flares. Each bomb contains a number of Target Indicators which can be released at a predetermined height. The long thin canisters are "Drip" flares

Egg Gen. One Egg per Man per Trip." In other words, if you had one before you took off you had "had it" when you came back.

After breakfast the Beaufighter crews adjourned to the operations room to wait for the order to scramble. All the main briefing had been carried out the night before, and only final details needed to be noted. The Shipfinder aircraft had already taken off and was searching in the most likely area for the convoy. There is one sure thing about shipping and that is the slow speed at which convoys move. They are always to be found fairly close to where they were last located.

Presently the exact course and distance came through, and the aircrews moved off immediately to their aircraft. Flotation jackets and parachute harness, for all their inconvenience, at least help to keep one warm, and there was a bitter wind blowing across the airfield while I waited to get on board the Beaufighter. When the escape hatch-cum-door had been closed and the engines started, the cabin soon warmed up. Except for a needle-sharp draught down by my left foot, there was no discomfort at all. With engines ticking over we followed the waving torch of the man leading us to the perimeter track. At each slight change of direction there came a gentle "shsss-shsss" as the brakes were operated to guide the Beaufighter. A final engine run-up of the Hercules as we got to the runway, and then a request over the R/T to Control for permission to scramble.

Even with an extra passenger, the Beaufighter rose like a balloon and we were soon cruising over the North Sea at 190 knots. Despite the apparent coldness on the airfield, the air temperature showed as plus 6 degrees Centigrade, which proves what a poor judge of temperature is the human frame. I should have guessed there were five degrees of frost at least.

FATEFUL FAIRYLAND : Orange-coloured target indicator flares lighting up the sea. A vivid display as seen from the cockpit of an attacking Torpedo-Beaufighter flying above the water. The first light of dawn just marks the sky.
(Above) BEAU PILOT : Wing Cdr. E. P. W. Hutton, D.F.C., A.F.C., Wing Commander Flying of a Coastal Command Station, silhouetted against the dawn light on the way back to base.

Behind me the navigator, F/O. J. D. Daly, appeared as a dim outline as he leaned over his chart table. In front, the pilot was silhouetted against a starlit sky which was showing the very first slight tinge of grey dawn. The air over the sea was calmer than it had been over the land, but every now and then a rough patch made our progress feel like a speedboat on choppy water.

Over the inter-comm. the first Beau announced his arrival at the scene which was now lit up by a drip for all to see. The drip flare is well named because it hangs in the sky as a long streak of dripping white light until, with a final small pop, it goes out.

We were at a low altitude. Quite an impressive height over an ice-cold sea on a December night if one has a little imagination. The radio altimeter, the only instrument which makes such heights in the dark possible, was flicking its red, green and white indicator lights on and off in the bumps which we were getting. It was a wonderful demonstration of the sensitivity of the radio altimeter which registers changes of height as small as ten feet.

Presently the Wellington gave

SHIPFINDERS

READY RECKONER : F/O. J. G. Daly, Wing Cdr. Hutton's navigator, works out his course to meet the reconnaissance Wellington.

TOP SCORER : Sqdr. Ldr. H. G. Keillor, D.F.C., who has probably sunk six E-boats, four merchant vessels, two minesweepers and two tank-landing craft.

the prearranged signal and set course for the convoy. Beaufighters with their extra speed had to weave to avoid arriving too soon; then, with a word of warning, the Wellington dropped the target indicators. Instantly the sea for miles was bathed in an orange glow and the outlines of the ships could be discerned just coming into the lighted area.

Torpedo Sight

The nose of the Beaufighter went down and speed increased to somewhere in the region of 300 m.p.h. The pilot adjusted the torpedo sight (this is a tiny lamp in the top bar of the windscreen which throws a dim spot of light on the bottom bar and is adjustable for speed and angle of the ship attacked) and pressed the torpedo release. On an actual attack the 20 mm. cannon are all loaded, but with so many of our own aircraft about in the dark it is considered unwise to use them as anti-flak weapons.

Everything finished as quickly as it started. In a few moments we were on our way back home over the cold grey waters now lit up by a wintry dawn.

Back over the airfield we gave our call sign and asked permission to join the circuit. Later we were given permission to "pancake." Wheels and flaps went down, airscrews were put into fine pitch and the Beaufighter made a perfect night landing at something over 100 m.p.h. As we turned off the runway the next Beau to land was telling control he was coming down.

Some figures of the work carried out by this particular squadron of Shipfinders are not without interest. Since D-Day the squadron has flown hundreds of sorties, dropped nearly 2,000 flares and made over 100 attacks. Several decorations have been awarded to aircrews of the squadron. It is estimated that 80 per cent. of the squadron members have five or six attacks to their credit and nearly all are second-tour men.

Wing Cdr R. G. Knott, D.F.C., who commands the squadron, first flew Wellingtons as a U-boat hunter and has three attacks to his credit—in the Mediterranean approaches, in the Azores and off Lisbon. He flew 400 operational hours in his first tour and has just begun his second tour.

Top Scorer

Sqn. Ldr. H. G Keillor, D.F.C., is the senior flight commander, and the squadron's top scorer. In a series of attacks ranging from Dieppe to Heligoland and dating from last May, he has probably sunk six E-boats (four of them in one attack) off Boulogne, four merchant vessels, two minesweepers and two tank-landing craft. One of the minesweepers burned for 30 seconds and then blew up.

Sqn. Ldr. J. A. ("Pip") Parsons is the second flight commander. In two successive sorties last July he attacked two forces of shipping off Dieppe. The first target was a formation of four or five vessels, and bomb flashes were seen between the first and second. On his next sortie he sighted five vessels (possibly minesweepers) by the light of flares and in face of concentrated fire made three runs before attacking, scoring a bomb burst on the stern of one of the ships and observing an orange flash. One night in September he shared with a Beaufighter an attack on a convoy of about 12 ships north of Den Helder that went in by the light of his flares.

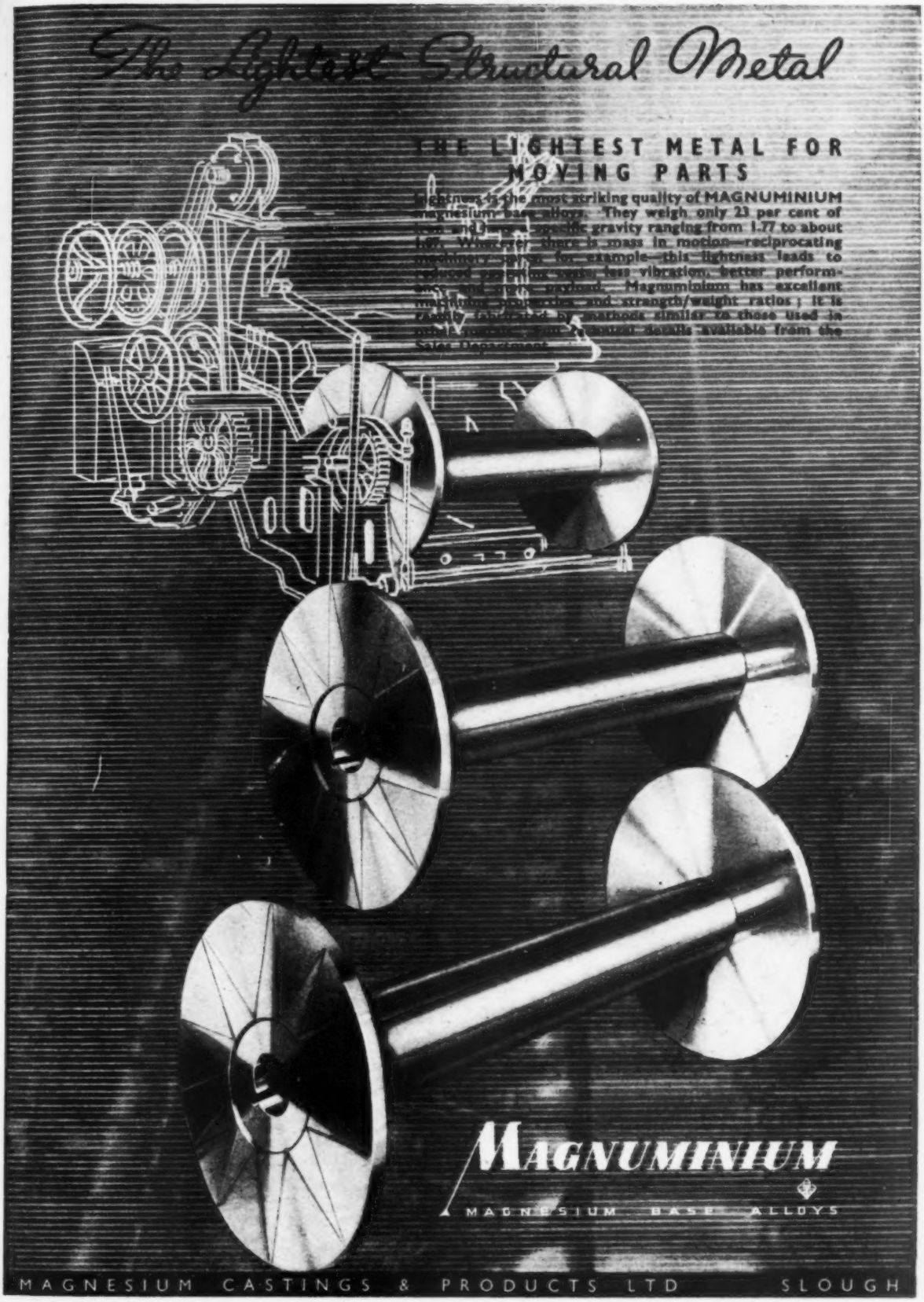
ERNEST TURNER GROUP LUNCHEON

CHARACTERISED by that atmosphere of friendly informality which is a pleasant feature of this annual occasion, the luncheon of the Ernest Turner Group, held at Grosvenor House, Park Lane, W.1, on Dec. 2nd, found Sir Frederick Handley Page in particularly good form as an entertaining "after-dinner" speaker. But he had some serious observations to make as well as witticisms, and pointed out that the chief concern of employers and the Government after the war should be "the gainful employment under pleasant conditions of the people for whose welfare and happiness they are morally responsible," and he said he wished that the kindly family atmosphere of the Ernest Turner Group obtained in some of our other big industrial concerns.

The aircraft industry, he said, had got to produce something entirely different from the bomber and the trainer for post-war civil aviation (here he humourously deprecated references to the Hermes as a modification of the Halifax) and Britain must concentrate on the education and technical training of young people of 16 to 21. Research was equally important. In the past we had led the world in steel, ships and railways, and now we led in aviation and radio, and we must accept new ideas even at the loss of present profits.

Sir William Letts, K.B.E., and Richard O'Sullivan, Esq., K.C. (Recorder of Derby), who said he had been able to enjoy the hospitality of Mr. Alan Turner "by kind permission of the Ministry of Transport and the Ministry of Food," also added to the gaiety of the occasion, which was rounded off by a cabaret show and the exhibition of Mr. Turner's excellently produced films illustrating many of the Group's activities.

The Lightest Structural Metal



THE LIGHTEST METAL FOR MOVING PARTS

Lightness is the most striking quality of MAGNUMINIUM magnesium base alloys. They weigh only 23 per cent of steel and have a specific gravity ranging from 1.77 to about 1.81. Wherever there is mass in motion—reciprocating machinery, for example—this lightness leads to reduced power loss, less vibration, better performance and longer life. Magnuminium has excellent machining properties and strength/weight ratios; it is easily fabricated by methods similar to those used in [illegible] Full technical details available from the Sales Department.

MAGNUMINIUM

MAGNESIUM BASE ALLOYS

MAGNESIUM CASTINGS & PRODUCTS LTD SLOUGH

"The next thing I knew was that the engine was on fire. There are, as you know, lots of buttons, gauges and gadgets in the cockpit of an aeroplane, but I found my extinguisher button at hair-trigger speed. The fire was doused, leaving a trail of smoke behind it."

Extract from a broadcast given by a flying officer on May 16.

Another crew saved for Britain with the help of . . .

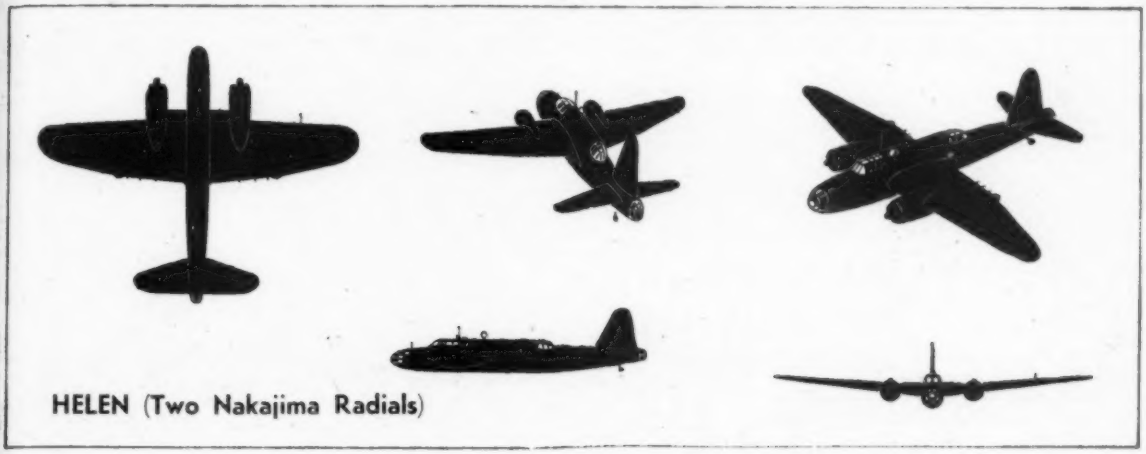
GRAVINER

FIRE-FIGHTING EQUIPMENT

GRAVINER SERVES THE ROYAL AIR FORCE

Studies in Recognition

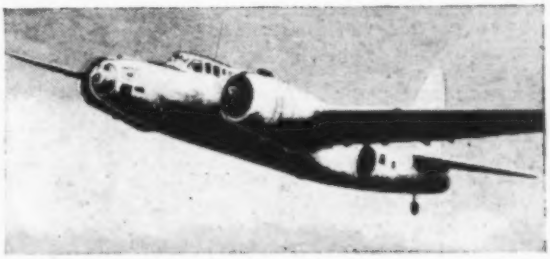
Aircraft in Flying Attitudes



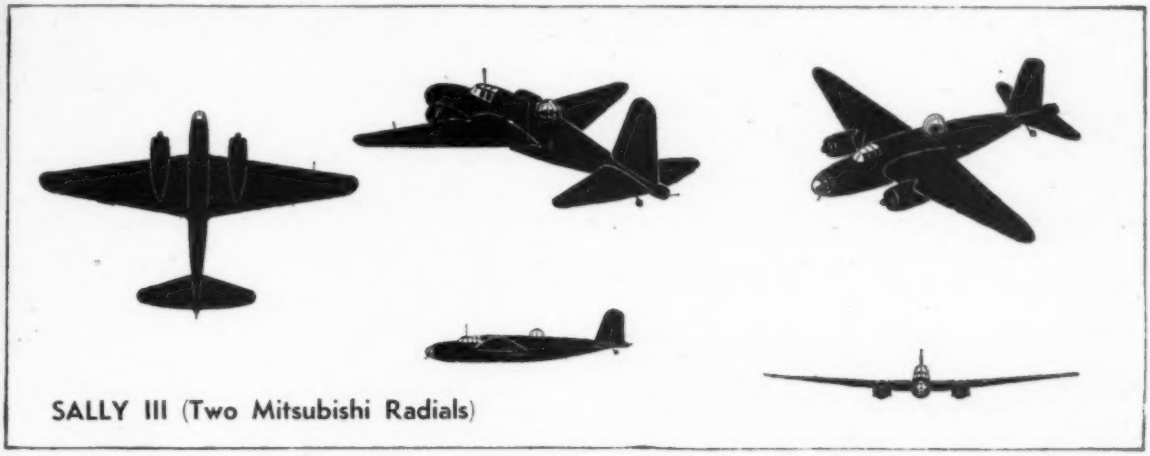
HELEN (Two Nakajima Radials)

THE Nakajima (Army 100) reconnaissance bomber, "Helen," is notable for one prominent recognition feature which might cause momentary confusion with the Mosquito; the leading-edge of its centre-section is set in advance of the leading edges of the outer wing panels.

Here, however, all resemblance to the Mosquito ends, for "Helen's" mid-wings have comparatively broad tips, the trailing edge increases its taper outboard of the flaps, and the engine nacelles end well short of the trailing edge. The tail-plane is of high aspect-ratio, with a straight taper to the leading-edge slightly curved trailing-edge, and small, round tips, while the single fin and rudder also has a straight taper to the leading-edge and curved trailing-edge. The deep oval fuselage has a raised cabin enclosure similar to the Boston. Dimensions: Span 66ft. 7in., length 53ft.



Nakajima reconnaissance bomber, "Helen."



SALLY III (Two Mitsubishi Radials)

A DESCENDANT of the Mitsubishi OB-97, "Sally III" is powered by a pair of Mitsubishi Type 100, air-cooled, radial engines and has a top speed of about 300 m.p.h. The chief visible difference from her "honourable ancestor" is the fitting of a dorsal turret in place of a screened gun-position. The glazed conical nose and pointed fuselage tail with remotely controlled m.g., remain substantially the same as on Sally II. The "Sally" series broke away from the raised enclosure amidships which characterised the OB-97.

The mid-wings with uniform taper from broad roots to small rounded tips and dihedral from a narrow flat centre-section, have the relatively small radial engines underslung, and the wide tailplane has greater taper on its leading edge. A tall fin and rudder has a rounded apex. Dimensions: Span 74ft. 8in., length 52ft.

Mitsubishi bomber, "Sally III."

CIVIL AVIATION

Flying-Boat Terminals

Centre-to-Centre Operation : Martin Terminals for Trans-Ocean Types

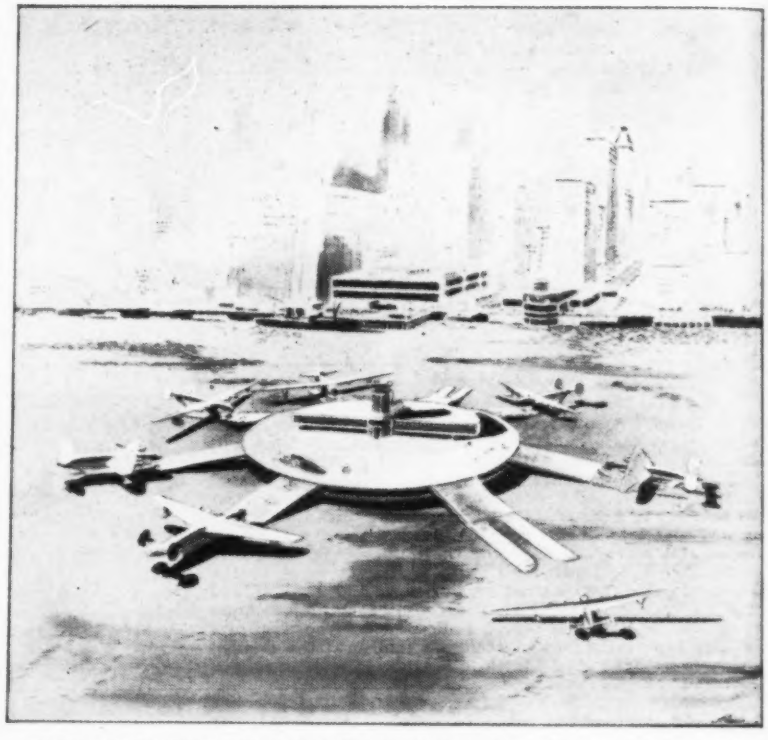
ALMOST since flying came of age the controversy flying boat versus landplane has gone on unabated. While the balance is delicate and each is assigned its pros and cons, wartime developments have probably tipped the scale slightly in favour of the land-based aircraft. The sheer military need for large numbers of various types of land-based aircraft has forced its rate of progress, and foreshadows its future predominance This tendency is evidenced by the preponderance of the landplane in the majority of plans dealing with post-war international and inter-continental air transport.

But the flying boat is by no means on the decline. In fact, it would seem that at least in some respects its post-war chances have improved: for with the growing need in payload increase, it is worth noting that a large-size flying boat can carry half its gross weight in disposable load, while with the landplane the proportionate dead weight (such as that of the landing gear) increases considerably with increased size.

An American View

The views of Mr. Glenn Martin, one of the pioneer flying-boat builders of America, are here of special interest. Holding that, as aircraft mount in size above the 100,000 lb. mark, the flying boat gains increasing advantage and that the only practical limitation to the size a flying boat can be built is the available payload, Mr. Martin maintains that the advantage in speed of the landplane narrows as size goes up until it reaches negligible proportions at around 200,000 pounds.

Other advantages cited by Mr. Martin for the large flying boat are increased safety over both sea and land (flying boats have landed in 15-foot seas in this war and taken off again with staggering loads, and some have landed on land without damage), ability to operate to and from any country on earth wherever there is protected water, and roomier and more comfortable interiors.



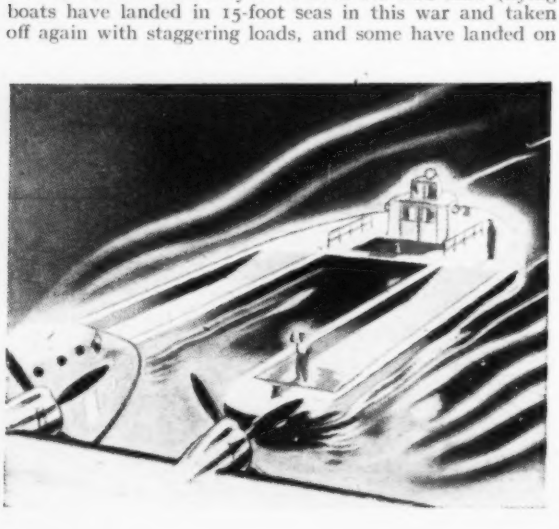
THE MAGIC CIRCLE : The island type terminal can be built in inner harbours and connects with the shore by a tunnel.

The flying boat indeed has in Mr. Glenn Martin a most capable and resourceful champion. For apart from his confidence in its performance qualities, his advocacy extends shrewdly to the operational advantages of the flying boat in post-war air traffic.

In the past, flying boats have suffered from lack of adequate handling facilities in high-density traffic ports. Such facilities as existed were usually a good distance away from actual centres of commerce and traffic. A centre-to-centre operation of flying boats, directly into the commercial hearts of cities, would give the flying boat a considerable advantage over the landplane which is tied to outlying airports.

And since the increased size of modern airports forces their location still farther away from built-up areas, such advantage of the flying boat would be of material value to the operators.

To provide an answer to this problem, Martin engineers developed designs for special terminals which would require no great area of land, but would use only a modest strip of harbour shoreline for its terminal building and service hangars, and would be relatively inexpensive.



The U-shaped tug can turn a flying boat almost on its heel.

One design is in the shape of a pier, jutting into the harbour, with floating tidal docks for the loading and unloading of passengers, mail and freight. A U-shaped, highly manœuvrable tug

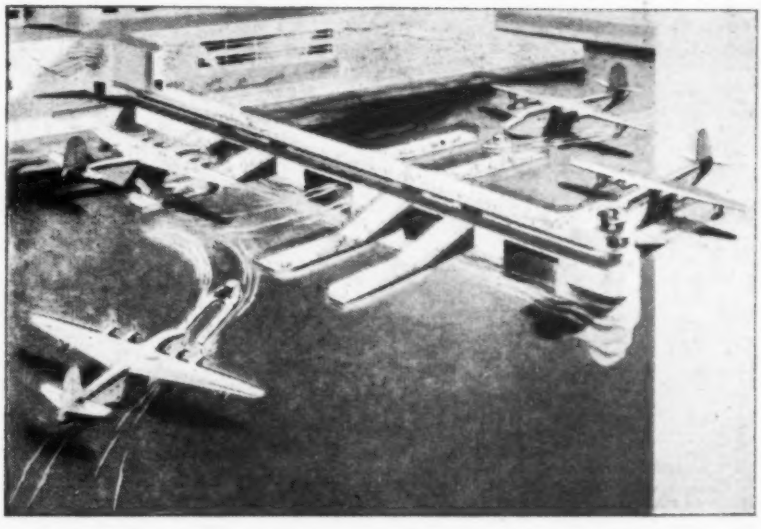
FLYING-BOAT TERMINALS

would be used for handling the "flying vessels" in congested harbour waters for docking, and would then proceed under the pier and away for another assignment.

Another more expensive design is the "island type" installation; a great circular affair which can be built off-shore in the harbour and therefore requires very little shore space. A tunnel would connect the terminal to the land. The terminal building is in the centre of the circle and the tidal slips are ranged around the perimeter of the circle.

Still another design for a shoreline terminal provides for final handling by means of an electrically controlled high-speed cable which docks the flying boat from the alighting areas.

As an integral part of the equipment, Martin engineers developed a tug built around three high performance outboard engines—one on each leg of the horseshoe and the other at the bow. Each of these engines would be capable of turning a full 360 deg., thus allowing it to turn a huge flying boat "on its heel." These tugs would meet and bring in incoming vessels taxying-in from the water alighting areas and would tow loaded aircraft from the terminal to free water for take-off.



The pier-type terminal jutting from a terminal building in an inner harbour.

The flying-boat terminals are intended only for large cities with heavy air traffic, while in ports of call having light traffic—it is explained—even barges can be used to load and unload the vessels. For alighting and traffic handling in such ports the Martin engineers have designed a special version of the U-tug.

No less interesting than the originality of the designs, is the claim advanced by Mr. Martin that the cost of his terminal installations would be but a tiny fraction of the expenditure of several million dollars involved in the construction of 10,000ft. long concrete runway terminals. This is indeed a most important point, for it is quite likely that some countries, especially those where ground facilities have not yet been built-up, would shrink from allocating such vast sums for the provision of landing facilities for land-planes, irrespective of their importance or attraction to international air transport operations.

Dwelling on the economic aspect of this centre-to-centre flying-boat service, and with an eye on his country's keen interests in Latin-American transport, Mr. Martin points out that practically all the large commercial centres of Latin-America are built on navigable waters.

And since water alighting areas already exist all over the globe, and with the new equipment there is no need to wait for elaborate and costly airport projects, Mr. Martin strikes a most effective chord; that the flying boat offers America a quick advantage in post-war world trade, a point which should not be overlooked.

IMPORTANT AGREEMENTS AT CHICAGO

IN a statement issued at the close of the Chicago Civil Aviation Conference, Lord Swinton, leader of the British delegation, declared: "Far more attention has been focused on matters on which the Conference has failed to agree than on matters on which agreement has been reached. The latter are very important. If the Conference had been convened to deal only with these matters it would have been pronounced a success."

The statement, published in London, added, "All that has been agreed will find its place in an international convention and in an interim agreement, and grant of freedoms one and two (the right of innocent passage and of landing to service planes) will form the subject of a separate agreement which will become effective between the countries as soon as they signify their acceptance of it."

On the other important aspects of air transport, it had been agreed to refer these matters to an interim council.

"This in no way means shelving the attempt to find a solution. On the contrary, this course has been adopted as the best to secure agreement.

"Moreover, though agreement has not been reached, the Conference has helped towards solution. Apart from questions of principle, such as control of frequencies to secure a reasonable equilibrium between traffic and services, the fair allocation of services between air lines, and powers of international organisation, we all have a clear knowledge of the practical difficulties to be met. For example, I think everyone is now agreed that no precise formula for regulation could govern all routes.

"On the other hand, I think there is a large measure of agreement on principles which it would be reasonable to apply on different routes and in different areas. This is the keynote of the last British proposal, where we put forward general principles of universal application which correspond closely to those which the Civil Aeronautics Board of the United States applies to its internal air services. Moreover, powers which the British plan seeks to give to the international organisation are in many respects similar to the powers which C.A.B. itself exercises within the United States."

SAFEGUARD

THE Chicago Air Conference has decided that "Axis or Enemy countries" could only be admitted into the future aviation organisation if four-fifths of the assembly voted in their favour.

Any State invaded by the "axis" nations could decide to exclude their entry if they so wished.

The Air Conference also decided to change the name of the projected Post-War Air Authority to the "International Civil Aviation Organisation."

CO-OPERATION

THE completion of negotiations between Britain, Argentina and the U.S. for the formation of an air company using British "Dominie" aircraft manufactured by the de Havilland Co. was announced at Chicago by an official spokesman of the British Delegation to the International Air Conference.

The company has been formed with 60 per cent. Argentine capital and 20 per cent. each from Britain and the U.S.

The spokesman added that the "Dominie," a twin-engined biplane, is too small for any war use, so there will not be any diversion of our war effort. Lend-Lease has no bearing on the matter whatsoever.

CIVIL AVIATION NEWS

THE INTERIM COUNCIL

AT the conclusion of its deliberations the International Aviation Conference elected Britain, the U.S., France, Holland, Belgium, Brazil and Mexico to the Council which will serve as the executive body of the interim organisation to supervise air transport, pending the ratification of a permanent treaty.

BERMUDIAN PLANS

AN air service between Bermuda and Canada and Bermuda-New York is planned by the Bermuda Airways, Ltd.

A petition for the incorporation of this company has been presented to the Bermuda House of Assembly by three Bermuda business men and Mr. Edward Goodeve, vice-president of the Canadian Air Express, Ltd. It is stated, however, that the new company is a Bermudian enterprise, not connected with the Canadian Air Express.

FLYING SATURN

THE Lockheed Aircraft Corporation has designed a special post-war aircraft to provide low-cost, short-haul air transport for general domestic use.

Designated the Saturn 75 and described as a high-wing, all-metal, land-based type, the aircraft is capable of carrying 14 passengers, a crew of two and cargo. It is powered by two 525 h.p. engines and has a cruising speed of 240 miles an hour over a maximum range of 1,600 miles.

A low landing speed of 73 miles an hour will enable the aircraft to use small airports. Interchangeability of parts and quick-changing power-plant units are important economy features.

Production of the Saturn 75 will be started as soon as military production permits.

TRANS-PACIFIC

FOR over 12 months Nip scouts were peering into the skies hoping to intercept Australian aircraft bound for India.

But despite the fact that the greater part of the route is through Japanese-patrolled territory, the cunning Aussies were only once embarrassed.

A 3,500 miles crossing of the Indian Ocean is involved in the regular non-stop service from Australia to India which was re-established over a year ago and is operated by Qantas Empire Airways.

The service is maintained by a small fleet of Catalinas fitted with special long-range tanks and equipped for passenger accommodation. The Catalinas fly with an all-up weight of 35,000 lb., carrying 1,000-1,200 lb. of payload and approximately 16,000 lb. of fuel. The average weight of mail and freight carried is 500 lb.

The average time for the trip is approximately 27 hours, and when operated under heavily loaded conditions each Catalina has a fuel range of 36 hours.

MAIL-ORDER AIR PORTS

PACKED airport equipment which may be purchased complete from a catalogue has been developed by the Westinghouse Electric International Company to meet the needs of foreign markets.

While the company does not propose to ship runways, the packed equipment includes a variety of assemblies such as electrical generating and distributing, runway marker lights, signalling and meteorological equipment, public address system and even pre-fabricated terminal buildings, hangars, offices and guest-houses.

Designed to suit different climatic conditions, the equipment is classified in four groups ranging from a small landing field to a complete assembly for a full-size 12,000ft. runway international airport.

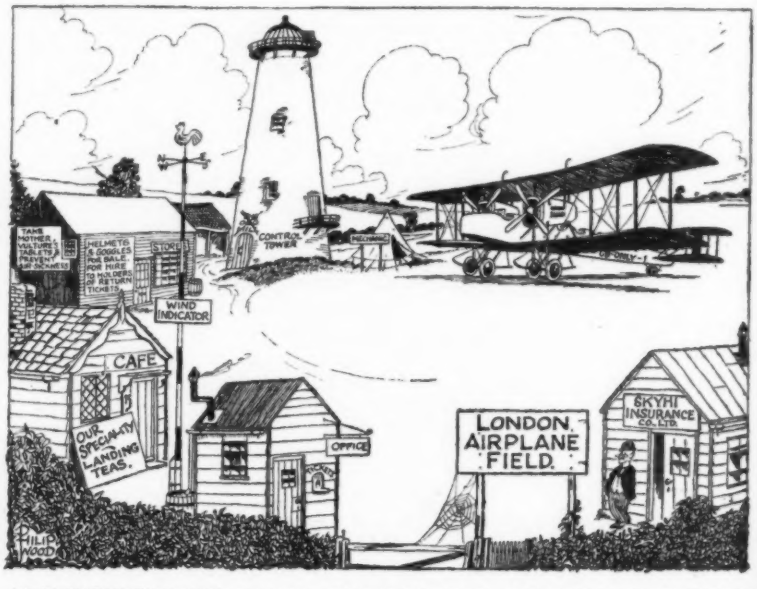
REVIVAL

CIVIL Air services on a restricted scale were resumed in the Union of South Africa after being suspended since May, 1940.

Six twelve-seater Lockheed Lodestars equipped with the most modern navigational apparatus are being used, and four more will join the fleet soon.

Mails are not being carried at present, but an air postal service is to be reconsidered when more aircraft are available.

The crew of all the aircraft were employed by South African Airways before the war and were released from military service to take up their old jobs. The service to Rhodesia is also being resumed.



IN DARKEST ENGLAND — CIVIL AVIATION TODAY. ACCORDING TO THE CRITICS.

HAMILCAR GLIDER

(Concluded from page 638)

Having described the rudder structure, we have similarly covered the elevator, for the construction is virtually identical. There are, however, no horn balances on the elevator tips although the hinges are back-set in the conventional manner; a further point is that the central part of the elevator trailing edge is cut away despite the fact that the rudder is set well above the elevator level—this gives some indication of the large upward movement range of the elevator. Trim tabs are carried centrally in the trailing edge of the port and starboard elevator halves.

All flying-control transmission is cable, with chain inserts running over sprockets to which are secured the torque shafts and bell-crank linkages through which final movement is imparted to the respective surfaces. Control forces are therefore light, and this factor alone is of cardinal importance to the pilots who, as well as having a better "feel" of the machine, do not have to put up very much of a physical struggle whilst on tow. It must be appreciated that, despite servo-trimming tabs on the control surfaces, it is very rarely that a glider on tow can be flown for more than a few moments "hands off," so that glider pilots have to *fly* their aircraft the whole time, and with high stick-forces to combat this is no easy thing.

Hamilcar pilots do not wear parachutes. In view of the fact that the crew personnel manning the loads do not carry brolleys it is a point of honour that pilots should do without, too.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers not necessarily for publication, must in all cases accompany letters.

WEIGHTY PROBLEM

A Matter of Airborne Ounces

I AM rather troubled, and that which is causing me such uneasiness is a little matter that perhaps some other reader of *Flight* may see far more clearly than I.

It concerns the weight of a bird in a cage, airborne and perched. Thus, the canary (for example) weighs 1 oz., and the cage weighs 20 oz. Now when the little feathered friend is standing on the perch the total weight of the cage and bird is 21 oz.; that much I grasp, but where I get completely foxed is in assessing the total weight of cage and bird when the latter is flapping round doing his daily dozen.

JONATHAN-PEEL.

HORACE SAYS . . .

Discouraging Things About Umbrellas

ALTHOUGH I disagree with Horace's political opinions, being inclined to a South American dictatorship instead of a seat in the House, I feel compelled to agree with him as regards the Liberator question.

However, I dislike his airy talk about volumes cubing, even though it is true. The wing area of a "Lib." = 1,050ft. ∴ Wing area of 25,000 "Libs." = 26.25×10^6 sq. ft.

One square mile = 27.9×10^6 sq. ft. ∴ Area covered = 0.94 sq. miles. As the aspect ratio of the "Lib." = 11.51 and aspect ratio $= \frac{\text{Span}^2}{\text{Area}}$, $\text{Span}^2 = \sqrt{\frac{11.51 \times 26.25 \times 10^6}{5280}}$ miles. Which, strangely enough, results in Horace's solution of 3.3 miles.

I should advise Horace not to mention umbrellas when he is canvassing. After raising the hopes of the public that free trade would soon result, and international cartels would be broken, the fact that umbrellas must still be bought is very discouraging.

Incidentally, can Horace give the aerodynamical equation for his smoke rings. As a last thought, might I suggest that Horace lightens the load on the strut in the Albert Hall by attaching to the memorial a balloon whose volume is equivalent to all the balloons in the barrage of the Metropolitan Police Area? But I will leave him to work that out himself.

P. A. HEARNE.

TAKE-OFF TACTICS

Minimum Take-off Speed Rarely Used

IN his letter in *Flight* of December 7th, "All At Sea" seeks enlightenment for the wardroom on the subject of take-off.

Without going to the extent of evolving theory to fit the nebulous impressions of the genus "pilot," one can say without equivocation that an aircraft's minimum take-off speed is just above its stalling speed. It is pretty unwise to haul a machine off at the minimum speed at which it *can* be unstuck because the speed reserve is so small that one is virtually asking to come unstuck oneself. Nevertheless, the aircraft can, shall we say, be taken off the deck at 70 knots when its stalling speed is 60 knots, and given that premise, then the only criterion affecting take-off run is the time interval in which the machine can be accelerated from rest to 70 knots.

The object of raising the tail at take-off is to reduce aerodynamic drag to as small a quantity as possible, and thus allow the most rapid acceleration to take-off speed.

It must, then, be appreciated that the shortest possible (unassisted) take-off distance is attained by lifting the tail quickly and accelerating to the unstick velocity without dawdling.

Regarding the business of holding down the tail and letting the main wheels come off as soon as they will, it seems to me that the quick take-off impression resulting is gained from the fact that the pilot is letting the wings do their stuff as soon as they are able, whereas normally the aircraft is not unstuck by the pilot until a higher speed has been reached than the actual minimum take-off speed possible.

The minimum take-off speed can be ascertained by doing a normal take-off, but as speed builds up, giving a slight back pressure on the stick in order that the aircraft starts flying as soon as the lowest take-off speed is reached. It will be found to be appreciably lower than the speed at which the aircraft is normally flown off.

"LANDLUBBER."

IMPLICATIONS OF V.2

Gravity versus Centrifugal Force

IT was with some surprise that I read Mr. K. W. Gatland's letter in *Flight*, November 30th.

In this issue he stated that if a V.2 rocket were used purely for vertical ascent its performance would be in the order of 10,000 m.p.h., or three miles a second, and that at this speed it could rise about 800 miles against gravity.

He then went on with the remarkable statement that if the normal warhead were replaced by a smaller portion of V.2 of the same fuel/payload ratio it would never return to the earth at all.

The speed of three miles a second, though impressive, is hardly sufficient to nullify gravity. If gravity is to be exactly counterbalanced by centrifugal force a speed of 7½ miles a second is necessary.

Your correspondent, however, then came out with the second statement, which presumably increased the speed to the 7½ miles a second mark. Has he thought, though, how much extra energy would be needed to gain this speed?

I fail to see where the necessary extra fuel is coming from when the total weight of the rocket is only 15 tons. A fuel load of 1,000 times this figure might be adequate to clear the earth's atmosphere.

Finally, I might say that there is still a very real handicap if passengers are to be included in the car, for the acceleration would be so great that every living being in the rocket would be killed.

R. SPEARMAN.

GENERALISING ON JAPS

Some Fundamental Recognition Features

MIGHT I take advantage of your columns to state a few facts which may prove useful to those contemplating a study of Japanese aircraft types with a view to possible future encounters?

It is generally accepted that it is a bad principle to accredit certain machines with national characteristics, as witness the "perilous" trips of aircraft with twin fins and rudders over certain areas of this country in the earlier days, or to encourage complexes; as F/O. E. A. Wren so aptly says, anything with a cranked wing that happens to have its undercarriage down is, even to-day, liable to be dubbed a "stooker," whether on the screen or in the sky.

In the case of the Japanese it is rather different and it is possible to trace certain fundamental features which are either consistently present or absent in their designs. Subject to revision, therefore, one might make the following generalisations for what they are worth.

With the possible exception of the flying boat "Emily" and her predecessor, there are no true high-wing operational Jap aircraft to date.

There is a characteristic semi-angular cut-away wing-tip which is common to certain Jap aircraft and to the aircraft of no other Power. "Betty," "Irving" and "Dinah" possess this.

There are exceptionally few Jap aircraft to date which possess a straight leading edge to the tail plane. The aged "Mavis" is one; this helps to make a Beaufighter distinctive. In many Jap types the fuselage is carried to an extreme point aft of the rudder, a fashion favoured by our late enemies the Italians in such machines as the Fiat G-50, S.M.82, and the old Cant Z 1007bis. "Zeke," "Hamp," "Jack" and "Kate" all have this, which helps to distinguish them from P-47's. This feature, though not entirely confined to Jap types, could help as a preliminary warning.

Finally, it does not seem to be beyond the bounds of reasonable conjecture that elements of the *Luftwaffe*, with the aid of very extra-long-range tanks, may choose to evacuate themselves eastwards, and carry on under Japanese administration, thus the labour of those who have sweated to swot, perhaps literally, the machines of the *Luftwaffe* may not be lost in the event of an encounter with a V.E.L.R. Me 262, and the elusive Hun may prove the more surprised if spotted first.

These few notes may be of little consequence, but if they help to contribute to the inevitable total eclipse of this synthetic sun (which should be visible from all parts) then they will have more than justified their expression.

"SENTEK."

GENERAL-PURPOSE BOMBER : The A-26 Invader, characterised by high-aspect ratio wings, is designed for a wide variety of offensive and defensive armament.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

Promotions

GENERAL DUTIES BRANCH.

Air Comdres. (temp. Air Vice-Marshals) to be Air Vice-Marshals, Dec. 1st, 1944 :—
R. D. OXLAND, C.B., C.B.E.
Sir Leonard H. SLATTER, K.B.E., C.B., D.S.C., D.F.C.
A. LEES, C.B., C.B.E., D.S.O., A.F.C. (act. Air Marshal).
Sir Brian E. BAKER, K.B.E., C.B., D.S.O., M.C., A.F.C.
J. B. COLE-HAMILTON, C.B., C.B.E.

Group Capts. (temp. Air Vice-Marshals) to be Air Comdres., Dec. 1st, 1944 :—
W. ELLIOT, C.B., C.B.E., D.F.C.
J. W. BAKER, C.B., M.C., D.F.C.
H. S. P. WALMSLEY, C.B., C.B.E., M.C., D.F.C.
A. B. ELLWOOD, C.B., D.S.C.
L. O. BROWN, C.B.E., D.S.C., A.F.C.
T. A. LANGFORD-SAINSBURY, O.B.E., D.F.C., A.F.C.
J. W. JONES, C.B.
S. P. SIMPSON, C.B., C.B.E., M.C.
C. R. STEELE, C.B., D.F.C.
T. M. WILLIAMS, C.B., O.B.E., M.C., D.F.C.

Group Capts. (temp. or war subs. Air Comdres.) to be Air Comdres., Dec. 1st, 1944 :—
E. B. C. BETTS, C.B.E., D.S.C., D.F.C. (act. Air Vice-Marshal.
C. H. K. EDMONDS, C.B.E., D.S.O. (act. Air Vice-Marshal).
A. L. FIDDAMENT, C.B.E., D.F.C. (act Air Vice-Marshall).
C. E. V. PORTER, C.B.E. (act. Air Vice-Marshal).
A. L. PAXTON, D.F.C. (act. Air Vice-Marshal).
P. F. MAITLAND, M.V.O., A.F.C.

Air Vice-Marshals granted the act. rank of Air Marshal :—
H. E. P. WIGGLESWORTH, C.B. C.B.E., D.S.C. Oct. 15th, 1944.
J. J. BREEN, C.B., O.B.E. Dec. 1st, 1944.

TECHNICAL BRANCH.

Air Comdre. (temp. Air Vice-Marshal) H. H. McL. FRASER, C.B., to be Air Vice-Marshal. Dec. 1st, 1944.

Group Capts. (temp. or war subs. Air Comdres.) to be Air Comdres. Dec. 1st, 1944 :—
C. B. COOKE, C.B.E.
E. J. CUCKNEY, C.B.E., D.S.C. (act. Air Vice-Marshal).
E. D. DAVIS, O.B.E. (act. Air Vice-Marshal).

Appointments

THE Air Ministry announces the following appointments :—

Air Vice-Marshal L. N. HOLLINGHURST, C.B., C.B.E., D.F.C., to be A.O.C. Base Air Forces, South East Asia, and to be Act. Air Marshal.

Air Comdre. A. C. H. SHARP to be Air Officer in Charge of Administration, Base Air Forces, A.C.S.E.A., and to be Act. Air Vice-Marshal.

Act. Air Comdre. A. J. RANKIN, O.B.E., A.F.C., to be Air Officer in Charge of Administration, Egypt.

Act. Air Comdre. H. V. SATTERLY, C.B.E., D.F.C., to command a Base in Bomber Command.

Group Capt. W. J. SEWARD, C.B.E., to be A.O.C. of a Group in Flying Training Command and to be Act. Air Comdre.

Group Capt. D. L. THOMSON, D.S.O., D.F.C., to command a Base in Bomber Command and to be Act. Air Comdre.

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following awards for distinguished services while operating from, or serving in, H.M. ships *Vindex*, *Striker*, *Mermaid*, *Keppel*, *Peacock* and *Whitehall* in the protection of convoys to North Russia in the face of attacks by U-boats :—

Distinguished Service Cross

Act. Temp Lt. Cdr. (A) F. G. B. SHEFFIELD, R.N.V.R.
Temp. Lt. (A) G. BENNET, R.N.V.R.
Act. Temp Lt. (A) P. S. COUCH, R.N.V.R.
Temp. Sub. Lt. (A) P. E. CUMBERLAND, R.N.V.R.
Temp. Sub. Lt. (A) J. LAWRIE, R.N.V.R.
Temp. Sub. Lt. (A) A. F. N. TURVEY, R.N.V.R.

Distinguished Service Medal

L/A. D. C. D. MARRIS.

FOR great courage and skill while operating with the Royal Air Force against the enemy :—

Distinguished Flying Cross

Temp. Lt. (A) D. R. O. PRICE, R.N.V.R.
Temp. Sub. Lt. (A) R. G. ARMITAGE, R.N.V.R.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy :—

Distinguished Service Order

Act. Wing Cdr. I. C. K. SWALES, D.F.C., D.F.M., R.A.F., No. 622 Sqn.—This officer has completed numerous sorties on his third tour of operational duty. He is a most inspiring leader whose outstanding ability, great drive and unswerving devotion to duty have contributed in a large way to the high standard of operational efficiency of the squadron he commands. He has rendered much valuable service.

Act. Wing Cdr. W. D. G. WATKINS, D.F.C., D.F.M., R.A.F., No. 15 Sqn.—Since being awarded the D.F.C. this officer has participated in a large number of sorties. He has continued to display the highest standard of skill, courage and leadership, qualities which have been reflected in the efficiency and fine fighting spirit of the squadron he commands. His devotion to duty has been unfailing.

Act. Sqn. Ldr. R. H. ROSE, R.A.F.V.R., No. 272 Sqn.—This officer has completed numerous sorties, involving many reconnaissances, attacks on enemy shipping and airfields. In September, 1944, he led a formation of aircraft in an attack on a liner in enemy waters. The attack was pressed home with great determination and the vessel was set on fire. In this well-executed operation this officer displayed the highest qualities of skill and leadership, and his excellent work contributed materially to the success achieved. He has set an example of a very high order.

Act. Sqn. Ldr. W. J. WELLER, D.F.C., R.A.F.V.R., No. 158 Sqn.—Since being awarded the D.F.C., Sqn. Ldr. Weller has completed numerous sorties, including three attacks on Berlin. On one occasion en route to Leipzig, the airspeed indicator became unserviceable. Despite this, Sqn. Ldr. Weller continued to the target. Later the starboard outer engine caught fire and became useless. Some height was lost but this pilot held to his course. In the vicinity of Leipzig intense anti-aircraft fire was encountered. Nevertheless, with the determination that has been such a feature of all his flights, Sqn. Ldr. Weller pressed home his attack to the full and afterwards flew the damaged aircraft back to this country. His fine fighting qualities, great courage and zeal were well illustrated in this spirited sortie.

Act. F/O. G. F. WALTON, R.A.A.F., No. 90 Sqn.—On his third operational mission in September, 1944, F/O. Walton was detailed to make a low-level attack on fortified positions in Calais in daylight. In the run-in F/O. Walton was met by intense light anti-aircraft fire. The aircraft was hit in several places. Undeterred, this pilot pressed home his attack and dropped the bombs with great precision. Not until the aircraft was well clear of the heavily defended area did F/O. Walton disclose that he had been wounded. His left forearm had been severely injured and he had sustained multiple leg wounds. Although suffering acutely he refused to leave the controls, and after a tourniquet had been applied to his arm and he had been given an injection to ease his pain he flew the aircraft back to England. Although almost at the point of collapse as an airfield was reached, F/O. Walton executed a masterly landing. He displayed outstanding bravery, fortitude and devotion to duty, setting an example of the highest order.

Act. Wing Cdr. H. G. GODDARD, D.F.C., A.F.C., R.A.F.V.R., H.Q., No. 170 Wing.—This officer has commanded his wing throughout the Imphal operations. He has at all times, by his gallantry and energy, set a magnificent example to all serving under him, flying on many operational sorties in a variety of aircraft, both by day and night. During this period Wing Cdr. Goodard has attacked enemy transport with success. He has also taken a creditable part in bombing operations and in the pursuit of enemy night fighters. In addition, this officer has taken a keen interest in the operational control of the aircraft and in the engineering aspect of the maintenance of landing grounds and accommodation for his squadrons. His work has been invariably of a high standard.

Act. Sqn. Ldr. D. C. BARNETT, D.F.M., R.A.F., No. 150 Sqn.—Sqn. Ldr. Barnett has a fine operational record and has completed three tours of duty. These have included attacks against many of the enemy's most important and heavily defended targets in Germany and occupied Europe. Throughout, this flight commander has displayed the utmost enthusiasm for operational flying, and by his fine fighting spirit and splendid example has set a high standard throughout the squadron. On one occasion in June, 1944, this officer was bomb aimer in an aircraft detailed for an attack on an enemy airfield in Austria. The attack took place in moonlight in the face of considerable enemy opposition. Sqn. Ldr. Barnett circled the target area until he could identify his objective by the light of the moon. He secured an excellent photograph, which confirmed the accuracy of his bombing.

Act. Sqn. Ldr. M. H. LE BAS, R.A.F.V.R., No. 241 Sqn.—Since this officer has been in command of his squadron he has taken part in a large number of operational sorties of a varied nature, including shipping and strategical reconnaissances. He has himself led his squadron on long-range low-level missions and bomber escorts. Under his fine leadership the squadron has recently achieved some brilliant successes and has inflicted considerable damage on the enemy's

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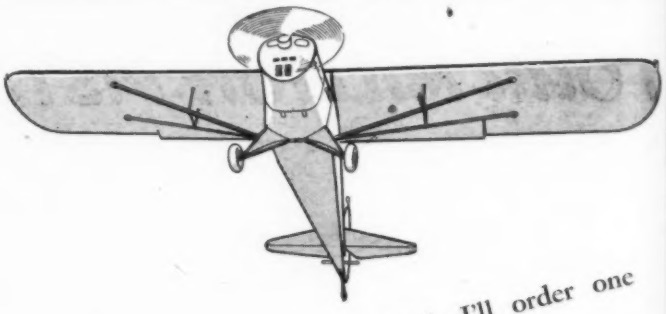

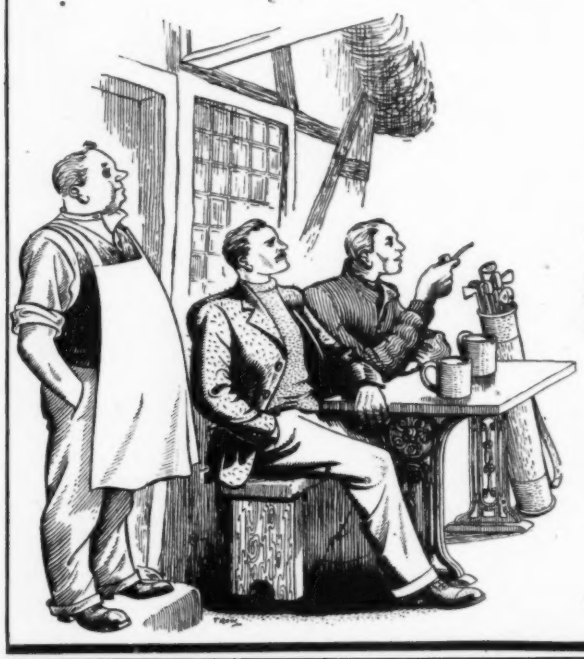

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Act. Sqn. Ldr. S. R. WHITING, R.A.F.V.R., No. 213 Sqn.—This officer has taken part in a large number of operational sorties. Since July, 1944, he has led his squadron on many low-level bombing operations against targets in the Balkans. He has invariably displayed great courage and determination, and his fine airmanship and leadership have been reflected in the outstanding operational record of his squadron.

Lt. Col. A. C. BOSMAN, D.F.C., S.A.A.F.—This officer has taken part in numerous successful missions. In the face of formidable enemy opposition he has led his wing with exceptional ability, consistently displaying great enthusiasm and a single-minded determination to achieve success. He has inflicted much damage on the enemy's mechanical transport and has destroyed eight enemy aircraft in air combat, bringing his total victories to at least ten enemy aircraft destroyed and others damaged. In addition, the tireless efforts of Lt. Col. Bosman, during the conversion of his wing to a Spitfire fighter bomber rôle, have largely contributed to the high operational reputation attained by the wing.

Lt. Col. A. C. JANDRELL, D.F.C., S.A.A.F., No. 21 Sqn.—Since the award of the D.F.C., Lt. Col. Jandrell has led his squadron on numerous occasions. Many of these sorties have been flown in close support of the Army and the fiercest anti-aircraft fire has been encountered. In February, 1944, this officer's aircraft was damaged by a shell, which passed through the mainplane and fuselage. On another occasion his aircraft was set on fire and the petrol and hydraulic systems damaged. On both occasions Lt. Col. Jandrell flew the damaged aircraft back to base, where he made a masterly landing. Despite these harassing experiences, he has continued to display the highest standard of courage and devotion to duty, setting an inspiring example to all in his squadron.

Wing Cdr. R. V. L. PATTISON, D.F.C., R.A.F., No. 100 Sqn.—This officer has displayed exceptional skill and great gallantry. His leadership has been outstanding and has inspired the squadron he commands. Wing Cdr. Pattison has executed many sorties on which he has taken new crews, whom he has imbued with great confidence.

Sqn. Ldr. J. J. O'MEARA, D.F.C., R.A.F.O., No. 131 Sqn.—Sqn. Ldr. O'Meara has completed a notable tour and throughout has displayed a high degree of skill and gallantry. His genius for leadership has been most evident, and has contributed in a large way to the operational efficiency of the squadron he commands. He is a relentless fighter and has destroyed twelve enemy aircraft and damaged many more.

Sqn. Ldr. D. L. PITT, D.F.C., A.F.C., R.A.F.V.R., No. 148 Sqn.—The excellent work performed by No. 148 Sqn. has been largely the result of Sqn. Ldr. Pitt's fine leadership. He has flown on over 20 operational missions during his tour. Sqn. Ldr. Pitt has shown a high degree of courage and, by his skill and determination, has set a fine example to all his crews.

Act. Wing Cdr. W. DRING, D.F.C., R.A.F.V.R.—Since the award of the D.F.C., Wing Cdr. Dring has completed a very large number of operations against the enemy. By his untiring efforts, leadership and excellent organising ability he has contributed in a large measure to the squadron he commands.

Bar to Distinguished Flying Cross

Act. Wing Cdr. J. S. W. BIGNAL, D.F.C., A.F.C., R.A.F.V.R., No. 105 Sqn.—Wing Cdr Bignal has continued to display the high standard of courage and operational skill which has characterised all his missions. Since the award of the D.F.C., he has completed many sorties. As flight commander he has set a high example of ability and devotion to duty which has won the admiration of all members of his squadron.

Act. Sqn. Ldr. E. R. BENSON, D.F.C., R.A.F.V.R., No. 109 Sqn.—Sqn. Ldr. Benson is now on his third tour of operational duty. He has proved himself a navigator of great ability and keenness. The consistently good results he has always obtained and his high sense of devotion to duty merit high praise.

Act. Sqn. Ldr. J. B. BURT, D.F.C., R.A.F.V.R., No. 109 Sqn.—Sqn. Ldr. Burt has continued to show, during many operational missions, the high order of courage and determination which earned him outstanding success before the award of the D.F.C. A fine pilot, this officer's efficiency and keenness to operate against the enemy have been an excellent example to all in his squadron.

Act. Sqn. Ldr. J. C. COOPER, D.F.C., R.A.F.V.R., No. 78 Sqn.—This officer has completed his second successful tour of operations. He has always pressed home his attacks with the utmost skill and determination, and has proved himself an outstanding leader and captain of aircraft. His undaunted cheerfulness at all times and his courage and coolness in face of the enemy merit high commendation.

Act. Sqn. Ldr. R. E. CURTIS, D.F.C., R.A.F.V.R., No. 109 Sqn.—Since the award of the D.F.C., this officer has continued to operate with courage and devotion to duty of a high order. He has completed numerous operational missions and is now on his third tour of duty. Sqn. Ldr. Curtis has set a consistently high standard of navigation and has proved himself a most reliable navigator.

Act. Sqn. Ldr. J. C. MAXWELL, D.F.C., R.A.F.V.R., No. 625 Sqn.—Since the award of the D.F.C., Sqn. Ldr. Maxwell has continued to show a fine fighting spirit. As a bombing leader, he has rendered service of an exceptionally high order, both on the ground and in the air. His keenness and devotion to duty have largely contributed to the high standard of bombing accuracy achieved by his squadron.

Act. Sqn. Ldr. S. E. PATTINSON, D.F.C., R.A.F., No. 207 Sqn.—This officer has completed two tours of operational duty and has participated in many successful sorties. As captain of aircraft and flight commander, he has at all times displayed exemplary skill and determination which have set a fine example to his crew. His outstanding leadership and sound judgment, combined with excellent work on the ground, have been of the utmost value in maintaining a high standard of operational efficiency in his flight and in his squadron.

Act. Sqn. Ldr. R. B. ROACHE, D.F.C., R.A.F.V.R., No. 635 Sqn.—This officer has completed many operational sorties against a wide range of targets in Germany and enemy-occupied territory. Since the award of the D.F.C., he has continued to display a high degree of skill, courage and resolution, which have been most praiseworthy.

DOWN TO THE SEA IN SHIPS : An airborne lifeboat, developed by the Emergency Rescue Branch of the Personnel Equipment Laboratory, Wright Field, Ohio, has just been released from under the bomb bay of a B-17 and the parachutes are almost clear.

SAFELY DOWN : The lifeboat has alighted on the sea and the men are hauling in the parachutes. The boat is 27ft. long and weighs 2,800 lb. With two 5 h.p. engines it has a speed of 8 m.p.h. on a calm sea.

Distinguished Flying Cross

P/O. J. B. RAPER, R.A.F.V.R., No. 100 Sqn.
P/O. A. RICHARDSON, R.A.F.V.R., No. 103 Sqn.
P/O. R. A. SARGEANT, R.A.F.V.R., No. 15 Sqn.
P/O. H. SMITH, R.A.F.V.R., No. 77 Sqn.
P/O. P. J. SMITH, R.A.F., No. 578 Sqn.
P/O. J. STREET, R.A.F.V.R., No. 10 Sqn.
W/O. J. T. COMAN, R.A.F.V.R., No. 50 Sqn.
W/O. G. F. GRAHAM, R.A.F.V.R., No. 50 Sqn.
W/O. A. MADDEN, R.A.F.V.R., No. 166 Sqn.
W/O. (now P/O.) S. S. PENNINGTON, R.A.F.V.R., No. 576 Sqn.
W/O. A. H. YOUNG, R.A.F.V.R., No. 576 Sqn.
F/O. D. J. CULLEN, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
F/O. H. C. STRUTHERS, R.A.A.F., No. 622 Sqn.
P/O. M. J. BRIDGMAN, R.A.A.F., No. 97 Sqn.
P/O. E. W. GIBSON, R.A.A.F., No. 113 Sqn.
P/O. L. N. RACKLEY, R.A.A.F., No. 630 Sqn.
P/O. H. J. WHITTICK, R.A.A.F., No. 460 (R.C.A.F.) Sqn.
W/O. (now F/O.) G. F. M. LINDENBERG, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
P/O. J. A. O'CONNOR, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
P/O. G. B. WARD, R.A.A.F., No. 10 Sqn.
F/O. J. SKOLNIK, R.C.A.F., No. 10 Sqn.
F/O. W. S. TELFORD, R.C.A.F., No. 625 Sqn.
P/O. M. A. CARSON, R.C.A.F., No. 101 Sqn.
P/O. W. J. ELLWOOD, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
P/O. O. E. JONES, R.C.A.F., No. 576 Sqn.
P/O. C. L. MIMS, R.C.A.F., No. 625 Sqn.
P/O. A. E. TOMKINSON, R.C.A.F., No. 625 Sqn.
P/O. A. L. WEAVER, R.C.A.F., No. 428 (R.C.A.F.) Sqn.

W/O.2 (now P/O.) W. L. NASH, R.C.A.F., No. 427 Sqn.
W/O. E. G. SPANNIER, R.C.A.F., No. 15 Sqn.
F/O. E. S. HENZEL, R.N.Z.A.F., No. 15 Sqn.
P/O. M. McL. MILNE, R.N.Z.A.F., No. 50 Sqn.
P/O. A. R. SPEIRS, R.N.Z.A.F., No. 7 Sqn.
Wing Cdr. N. B. R. BROMLEY, O.B.E., R.A.F., No. 169 Sqn.
Sqn. Ldr. G. D. ROBERTSON, R.C.A.F., No. 411 Sqn.
Sqn. Ldr. F. C. KRUGER, D.F.M., R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Flt. Lt. G. G. ATKINS, R.A.F.V.R., No. 305 (P) Sqn.
Flt. Lt. G. N. F. ROBINSON, R.A.F.V.R., No. 305 (P) Sqn.
Flt. Lt. E. W. GABITES, R.N.Z.A.F., No. 21 Sqn.
Flt. Lt. M. GRAHAM, R.A.F.V.R.
Flt. Lt. K. J. HARDING, R.A.F.V.R., No. 198 Sqn.
Flt. Lt. D. J. HAWKINS, R.A.F.V.R., No. 132 Sqn.
Flt. Lt. J. HEPWORTH, R.A.F.V.R., No. 613 Sqn.
Flt. Lt. E. H. A. VERNON-JARVIS, R.A.F.V.R., No. 175 Sqn.
Flt. Lt. W. J. MOORE, R.A.F.V.R., No. 174 Sqn.
Flt. Lt. J. A. QUINTON, R.A.F.V.R., No. 604 Sqn.
Flt. Lt. R. W. SMITH, R.A.F.V.R., No. 613 Sqn.
Flt. Lt. R. M. STAYNER, R.C.A.F., No. 401 (R.C.A.F.) Sqn.
Flt. Lt. P. V. TRUSCOTT, R.A.F.V.R., No. 169 Sqn.
Flt. Lt. D. WILLIAMS, R.A.F.V.R., No. 524 Sqn.
F/O. H. J. COBB, R.A.F.V.R., No. 524 Sqn.
Flt. Lt. J. H. BRYANT, R.A.F.V.R., No. 181 Sqn.
Flt. Lt. R. GUTHRIE, R.A.F.V.R., No. 181 Sqn.
Flt. Lt. D. MAXWELL, R.A.F.V.R., No. 245 Sqn.
Flt. Lt. G. E. MOTT, R.C.A.F., No. 441 (R.C.A.F.) Sqn.
Flt. Lt. B. J. OLIVER, R.N.Z.A.F., No. 602 Sqn.
Flt. Lt. T. F. ROSSER, R.A.A.F., No. 175 Sqn.
Flt. Lt. A. E. S. VINCENT, R.A.F.V.R., No. 181 Sqn.
F/O. R. C. DAVIE, R.A.A.F., No. 207 Sqn.
F/O. J. M. L. DRUMMOND, R.A.F.V.R., No. 107 Sqn.
F/O. O. R. KELSICK, R.A.F.V.R., No. 175 Sqn.
F/O. H. V. MARKBY, R.A.A.F., No. 174 Sqn.
F/O. R. C. McROBERTS, R.C.A.F., No. 421 (R.C.A.F.) Sqn.
F/O. B. W. PRANGE, R.C.A.F., No. 614 Sqn.
F/O. G. J. STEEL, R.A.A.F., No. 174 Sqn.
F/O. J. N. THOMAS, R.A.F., No. 613 Sqn.
F/O. G. A. WALLER, R.A.F.V.R., No. 604 Sqn.
F/O. A. A. WATKINS, R.C.A.F., No. 440 Sqn.
P/O. D. C. NOTT, R.A.F.V.R., No. 245 Sqn.
P/O. S. A. SIMMONS, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
W/O. G. V. FENWICK, R.A.F.V.R., No. 98 Sqn.
P/O. P. MAXWELL, R.A.F.V.R., No. 550 Sqn.
P/O. J. MORAN, R.A.F.V.R., No. 61 Sqn.
P/O. G. H. MOON, R.A.F.V.R., No. 192 Sqn.
P/O. B. D. MURPHY, R.A.F.V.R., No. 101 Sqn.
P/O. J. C. OWEN, R.A.F.V.R., No. 76 Sqn.
P/O. J. M. W. PASLEY, R.A.F.V.R., No. 576 Sqn.
P/O. F. N. C. PAYNE, R.A.F.V.R., No. 10 Sqn.
P/O. D. S. POTTER, R.A.F.V.R., No. 12 Sqn.
P/O. N. A. RANSHAW, R.A.F.V.R., No. 627 Sqn.
P/O. B. A. READ, R.A.F.V.R., No. 102 Sqn.
P/O. J. A. REID, R.A.F.V.R., No. 76 Sqn.
P/O. R. T. RUTTER, R.A.F., No. 100 Sqn.
P/O. W. A. SCHEERBOOM, R.A.F.V.R., No. 576 Sqn.
P/O. P. N. D. SKINGLEY, R.A.F.V.R., No. 101 Sqn.
P/O. W. A. SMITHER, R.A.F.V.R., No. 78 Sqn.
P/O. J. B. STARR, R.A.F.V.R., No. 12 Sqn.
P/O. G. SUTHERLAND, R.A.F.V.R., No. 138 Sqn.
P/O. D. W. SUTTON, R.A.F.V.R., No. 100 Sqn.
P/O. H. C. TABONY, R.A.F.V.R., No. 626 Sqn.
P/O. K. R. TATTERSALL, R.A.F.V.R., No. 161 Sqn.
P/O. J. H. TERRY, R.A.F.V.R., No. 76 Sqn.
P/O. R. THOMPSON, R.A.F.V.R., No. 426 (R.C.A.F.) Sqn.
P/O. K. G. THOMPSON, R.A.F.V.R., No. 101 Sqn.
P/O. G. W. H. UWINS, R.A.F.V.R., No. 76 Sqn.
P/O. H. E. WAKEFIELD, R.A.F.V.R., No. 51 Sqn.
P/O. J. L. WALKER, R.A.F.V.R., No. 622 Sqn.
P/O. W. L. WALTERS, R.A.F.V.R., No. 428 (R.C.A.F.) Sqn.
P/O. D. E. WALTON, R.A.F., No. 100 Sqn.
P/O. G. WESTMORELAND, R.A.F.V.R., No. 578 Sqn.
P/O. R. H. WINTLE, R.A.F.V.R., No. 625 Sqn.
P/O. G. F. WILSON, R.A.F.V.R., No. 619 Sqn.
P/O. W. J. WOODHOUSE, R.A.F.V.R., No. 15 Sqn.
P/O. G. A. WRIGHT, R.A.F.V.R., No. 78 Sqn.
W/O. G. ALLEN, R.A.F.V.R., No. 15 Sqn.
W/O. J. BYRNE, R.A.F.V.R., No. 101 Sqn.
W/O. P. H. CAMERON, R.A.F.V.R., No. 466 (R.A.A.F.) Sqn.
W/O. (now P/O.) P. A. CLOUGH, R.A.F.V.R., No. 625 Sqn.
W/O. E. F. GARDNER, R.A.F., No. 635 Sqn.
W/O. H. GRUNIBS, R.A.F.V.R., No. 192 Sqn.
W/O. P. V. HAZELDENE, R.A.F., No. 57 Sqn.
W/O. C. W. HIGGS, R.A.F.V.R., No. 90 Sqn.

SERVICE AVIATION

W/O. S. J. KNOTT, R.A.F.V.R., No. 582 Sqn.
W/O. W. H. MITCHELL, R.A.F.V.R., No. 192 Sqn.
W/O. A. G. ORCHARD, R.A.F.V.R., No. 156 Sqn.
W/O. G. A. PIDGEN, R.A.F.V.R., No. 622 Sqn.
W/O. P. W. S. POPE, R.A.F., No. 578 Sqn.
W/O. A. D. PRICE, R.A.F.V.R., No. 7 Sqn.
W/O. C. REYNOLDS, R.A.F.V.R., No. 90 Sqn.
W/O. J. D. SINNOTT, R.A.F.V.R., No. 626 Sqn.
W/O. J. P. A. WADE, R.A.F.V.R., No. 103 Sqn.
Act. F/O. L. H. ARROWSMITH, R.A.A.F., No. 90 Sqn.
Act. F/O. A. J. C. CASSELL, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
Act. F/O. J. H. DECHASTEL, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
P/O. G. H. R. TREASURE, R.N.Z.A.F., No. 115 Sqn.
F/O. E. T. ALBERT, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
F/O. R. E. BAER, R.C.A.F., No. 578 Sqn.
F/O. W. D. C. BECK, R.C.A.F., No. 625 Sqn.
F/O. W. R. BENNETT, R.C.A.F., No. 158 Sqn.
F/O. J. K. BROWNHILL, R.C.A.F., No. 12 Sqn.
F/O. A. A. BRYSON, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
F/O. E. S. COATSWORTH, R.C.A.F., No. 429 (R.C.A.F.) Sqn.

TWO WHO CAME BACK : Staff Sergeant S. Pearson and Staff Sergeant Wm. Herbert received the Distinguished Flying Medal from the King at a recent investiture. They won the awards in Normandy, and both took part in the Arnhem landings.

F/O. H. R. COLLVER, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
F/O. C. T. COOK, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
F/O. S. E. DOLAN, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
F/O. E. DYSON, R.C.A.F., No. 156 Sqn.
F/O. J. ELL, R.C.A.F., No. 15 Sqn.
F/O. J. D. FETHERSTON, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
F/O. C. L. FINKLESTEIN, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
F/O. H. O. FOY, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
F/O. J. W. GALVIN, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
F/O. W. J. GLIDDON, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
F/O. M. A. HAMPE, R.C.A.F., No. 51 Sqn.
F/O. D. A. HART, R.C.A.F., No. 51 Sqn.
F/O. G. F. HAWTIN, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
F/O. L. E. JACKSON, R.C.A.F., No. 626 Sqn.
F/O. K. W. KNOX, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
F/O. S. KRITZER, R.C.A.F., No. 640 Sqn.
F/O. R. E. LAWRENSON, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
F/O. W. J. LAWRENCE, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
F/O. D. H. LYBBERT, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
F/O. E. G. MACINNIS, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
F/O. K. A. MACDONALD, R.C.A.F., No. 434 (R.C.A.F.) Sqn.
F/O. H. McNABNEY, R.C.A.F., No. 78 Sqn.
F/O. F. G. MANN, R.C.A.F., No. 578 Sqn.
F/O. J. W. MAY, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
F/O. D. L. MOHER, R.C.A.F., No. 105 Sqn.
F/O. F. I. NELSON, R.C.A.F., No. 408 (R.C.A.F.) Sqn.

George Medal

L.A/C. W. J. CLARKE, R.A.F.V.R., No. 40 Sqn.—This airman has been employed as an ambulance driver for 12 months. These duties have led him into dangerous experiences during which he has acted with great coolness and disregard of his own safety. In November, 1943, L.A/C. Clarke took his ambulance right up to an aircraft which had crashed and caught fire. Disregarding the probability of bombs and ammunition exploding, he rescued a member of the crew who was lying beside the aircraft seriously injured. One night in April, 1944, he again drove his ambulance up to a blazing aircraft which was loaded with bombs and, with the assistance of a nursing orderly, extinguished flames on the clothes of three members of the crew by rolling the airmen in blankets. He then got them away from the scene just before the bombs exploded.

L.A/C. R. E. WILLIAMS, R.A.F.V.R., No. 40 Sqn.—This nursing orderly has been employed on ambulance duties for 13 months and has displayed considerable gallantry and devotion to duty. In June, 1943, an aircraft, on taking off, crashed into another aircraft, and both caught fire. Just before the ambulance reached the scene, some of the bombs in the first aircraft exploded. Despite the danger of further bombs detonating, this airman went direct into the wreckage and rescued one member of the crew and undoubtedly saved his life. In February, 1944, an aircraft, fully loaded with bombs, crashed in flames. When the ambulance arrived at the accident many bombs had not exploded. With great gallantry, L.A/C. Williams searched all round the blazing wreckage for members of the crew, knowing full well that bombs might explode at any moment. Again, in April, 1944, this airman and an ambulance driver were soon on the scene when a bomber aircraft, which was carrying a full load of bombs, crashed and caught fire. Three of the crew of the bomber had been splashed with petrol as they left the aircraft and their clothing was alight. L.A/C. Williams and his companion extinguished the flames by rolling the three airmen in blankets, and succeeded in getting them away in the ambulance just before the bomb load exploded. L.A/C. Williams has set an example of courage which has been an inspiration to all members of the squadron.

Roll of Honour

Casualty Communiqué No. 450.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list, 75 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. C. W. Appleby; Sgt. H. G. Barnfield; F/O. L. N. Bowles; Sgt. A. W. Christie; Act. Sqn. Ldr. J. R. Collins, D.F.C.; Sgt. J. H. Couch; Sgt. J. Dickson; Sgt. G. A. Grill; Flt. Sgt. G. C. Grimmett; Sgt. T. H. M. Instone; Sgt. E. N. Lowe; Sgt. C. F. Moore; Sgt. K. Neville; P/O. N. G. G. Newell; Sgt. H. F. J. Newell; Sgt. D. Pratt; Sgt. C. Roberts; Flt. Sgt. H. W. J. Savin; F/O. L. A. Shaw; F/O. H. G. R. Stapleforth; Sgt. C. W. Stern; W/O. L. T. Woodward.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. S. Ainsworth; Sgt. D. O. Davies; Sgt. T. R. Derrington; Sgt. A. J. Kirby; Sgt. D. P. Lawrence; Sgt. W. Mason; Flt. Sgt. S. P. Mirams; Sgt. K. Perkins; Sgt. M. V. Phillips; Sgt. B. L. Purvis; Sgt. K. W. Smith; Sgt. S. G. Tarrant; W/O. P. R. Waller.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. R. Atkin; Flt. Sgt. J. G. Blackwood; Sgt. J. F. Challis; Flt. Sgt. J. R. Colley; Flt. Sgt. J. Coulton; F/O. A. J. Davis; Sgt. G. B. Dickson; Sgt. C. Frankish; Flt. Sgt. G. H. Freeman; Sgt. T. N. Gibson; F/O. B. Gunnill; Flt. Sgt. H. Hanson; Sgt. A. V. Hipkiss; Sgt. W. Johnston; Sgt. D. C. Keeler; Sgt. D. J. McCarthy; F/O. D. J. O. Pyne; Sgt. W. H. E. Rosetta; Sgt. R. Skelton; Sgt. J. Sykes; Flt. Sgt. J. Warhurst; Sgt. R. E. Watts; F/O. N. V. Whiteman.

WOUNDED OR INJURED IN ACTION.—Flt. Lt. K. Hamlett; Flt. Sgt. T. G. Neill; Flt. Lt. W. G. Owen; Flt. Sgt. H. J. Saunders.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. O. B. Andrews; P/O. G. E. Batchelor; Sgt. W. F. Carter; Sgt. J. T. Dunn; F/O. J. D. Eglen; W/O. W. J. Knill; Sgt. G. A. Levy; Sqn. Ldr. E. W. Lindsay; P/O. H. R. Morris; Flt. Sgt. J. F. Philips; F/O. C. W. Rumley; Sgt. J. F. G. Stebbings.

MISSING.—Flt. Lt. D. Adcock; Sgt. R. S. Alderson; Sgt. W. S. Anstey; F/O. G. D. Askew; Act. Flt. Lt. G. B. Aungiers; P/O. D. Barr; W/O. H. Bath; F/O. A. J. Baythorp; Act. Flt. Lt. W. J. Bell; F/O. J. B. T. H. Bigland; Sqn. Ldr. J. Blackburn; Flt. Lt. H. S. Boardman, D.F.C.; Flt. Sgt. T. C. Bower; P/O. H. S. Bowles; Flt. Sgt.

SERVICE AVIATION

F. D. Brandon; Sgt. J. B. Brennan; Sgt. J. Brooke; Sgt. T. S. Brookfield; P/O. G. A. Brown; Sgt. W. F. Bullard; Sgt. W. F. Chambers; Sgt. H. Clarke; F/O. R. S. Cohen; Sgt. D. K. Cook; Sgt. V. C. Cornish; Flt. Sgt. P. G. Deaves; Sgt. J. C. Doughty; W/O. H. J. Dowse; Act. Flt. Lt. D. G. Evans; Sgt. J. V. Finney; Sqn. Ldr. J. Foulsham, A.F.C.; F/O. C. S. Goble; P/O. K. Gosling; Sgt. J. Gresty; Flt. Sgt. A. F. Grimwood; Flt. Sgt. W. Grisdale; W/O. G. G. Harker; Sgt. F. Howard; Sqn. Ldr. R. H. James; Flt. Sgt. R. H. C. Jones; Sqn. Ldr. N. A. Kynaston, D.F.C.; P/O. T. E. Leggett; Sgt. R. I. Lewis; Sgt. W. E. Lynch; Sgt. R. A. McKeand; Flt. Sgt. R. Mills; P/O. J. R. Mordan; Sgt. E. A. O'Connor; Sgt. B. Orrick; P/O. H. R. Osborne; Flt. Sgt. E. W. R. Pratt; P/O. K. F. Rawlinson; Sgt. I. H. M. Reid; P/O. B. A. Reynolds; Flt. Sgt. P. A. Shepherd; F/O. A. L. Smith; Sgt. J. Spencer; Sgt. S. J. Spooner; W/O. L. D. Stoddart; Flt. Sgt. G. W. Stott; Flt. Lt. J. Swarbrick; Flt. Sgt. P. B. Sweatman; Sqn. Ldr. K. G. J. Wakefield; P/O. K. L. Walker; Sgt. J. E. Walsh; Flt. Sgt. C. Watts; Flt. Sgt. J. Watts; Sgt. M. J. Watts; Sqn. Ldr. J. B. Weightman; Flt. Lt. W. Weir; Sgt. W. R. Wharmby; Sgt. N. V. Wilding; Wing Cdr. H. De C. A. Woodhouse, D.F.C., A.F.C.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—A/C.2 A. G. Clark; L.A/C. R. E. Giles; L.A/C. T. Gowland; L.A/C. P. L. Heath; A/C.2 W. E. Holder; Cpl. A. Johnson; A/C.1 L. Mawer; A/C.1 C. W. Turner; Cpl. J. Whelan.

KILLED ON ACTIVE SERVICE.—F/O. G. W. Arnold; Cpl. R. W. H. Bawden; Flt. Lt. The Hon. W. H. Burt; F/O. N. O'B. Butler; L.A/C. W. G. Colton; Sgt. G. S. Cumberland; A/C.1 G. G. Edmonston; Sqn. Ldr. J. H. P. Gauvain; Flt. Lt. V. T. J. Hand; Sgt. E. Heath; Sgt. A. J. Linegar; Sgt. A. G. Monnington; Cpl. A. S. G. Perring; Flt. Lt. B. N. Phillips; A/C.2 A. H. Reeves; Sgt. L. Sanderson;-Flt. Lt. B. R. Terry, D.F.C.; W/O. D. A. G. Trobridge; F/O. H. T. Wardle; Sgt. A. S. Watt; P/O. W. Wells; F/O. A. C. Willmott, D.F.C.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. P. B. Coates; Flt. Lt. H. L. Jarman; A/C.1 A. C. Morris; F/O. E. J. Pope.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—F/O. D. N. Blyth; Flt. Lt. R. E. Harvey; L.A/C. J. Hendon.

DIED ON ACTIVE SERVICE.—L.A/C. J. M. Anderson; L.A/C. W. E. Bestwick; Air Vice-Marshal O. T. Boyd, C.B., O.B.E., M.C., A.F.C.; P/O. G. W. Brown; Sgt. R. H. V. Cecil; A/C.1 T. Charnley; Cpl. J. M. Grace; Flt. Sgt. T. H. Harris; W/O. F. R. Haynes, M.B.E.; L.A/C. E. Holdridge; W/O. S. Hutchinson; A/C.1 G. Jones; A/C.1 J. F. Legg; Sgt. A. J. Mayhew; Cpl. K. Newey; Cpl. J. J. Pearson; A/C.2 L. Revell; W/O. E. Robinson; A/C.2 P. Robinson; L.A/C. T. B. Smith; Sgt. G. Tierney; L.A/C. S. Whorlton.

C.A.S. SEES FOR HIMSELF : Marshal of the Royal Air Force, Sir Charles Portal, G.C.B., D.S.O., M.C., recently visited Belgian airfields. He is seen here talking things over with Air Marshal Sir Arthur Coningham, K.C.B., D.S.O., M.C., D.F.C., A.F.C., A.O.C.-in-C., Second Tactical Air Force, and (left) Air Vice-Marshal E. C. Hudlestone, C.B.E., A.O.C. of a Group.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A/CW. O. M. Vallance.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. M. Bensley; P/O. A. J. Melay.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. C. De B. Dow.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. G. R. Brooker; Flt. Sgt. J. G. Collins; Flt. Sgt. A. S. Dodson; F/O. W. J. Dowling; Flt. Sgt. G. A. French; Flt. Sgt. E. R. Galligan; Flt. Sgt. L. C. Gomes; P/O. W. J. Hunt; Flt. Sgt. A. N. Moore; F/O. S. A. Morey, D.F.C.; Sgt. J. E. Nixon; Flt. Sgt. E. T. L. Osborne; F/O. L. F. Quinton; Flt. Sgt. L. T. W. Sheldon; F/O. F. T. Thornley; Flt. Sgt. D. J. Tresidder.

WOUNDED OR INJURED IN ACTION.—Flt. Lt. W. J. Menagh.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. R. H. Cato; F/O. A. R. Craine.

MISSING.—Flt. Sgt. C. F. Allen; Flt. Sgt. E. A. Bock; Flt. Sgt. J. J. Chigwidden; Act. F/O. T. E. Davis; Flt. Sgt. N. W. Gadsden; P/O. J. G. Gordon; P/O. A. H. Harvey; P/O. C. G. Hill; Flt. Sgt. M. D. Moffatt; W/O. F. McL. Percy; Flt. Sgt. P. H. Pye; Flt. Sgt. R. Thurlow; Flt. Sgt. M. J. Turner; P/O. G. York; Act. Flt. Lt. P. E. Young.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—W/O. A. A. Cook.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. K. K. Abrams; P/O. D. McF. Bowe; Flt. Sgt. R. J. Douglas; P/O. J. W. Hocking; W/O. J. A. Hopper; Act. Sqn. Ldr. D. W. McCormack, D.F.C.; Flt. Sgt. D. E. C. McGregor; Flt. Sgt. A. B. Talbot; Flt. Sgt. W. Thompson; W/O. M. J. Watson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. J. W. Pike; F/O. G. H. Waddell.

WOUNDED OR INJURED ON ACTIVE SERVICE.—W/O. J. A. Boulton; Sgt. A. F. Coates; P/O. R. F. Cross; Flt. Sgt. F. I. B. Ross.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. R. H. Legrow; W/O. R. S. Lyle; F/O. R. Seigler.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—W/O. J. E. Ryan; P/O. C. B. Steeves; P/O. M. H. Thompson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—W/O. W. H. Arnold; W/O. R. M. Barlow; Flt. Sgt. W. J. Crozier; Flt. Sgt. J. R. Fitch; Flt. Sgt. J. P. C. Gordon; Flt. Lt. K. MacG. Gray; F/O. J. D. Hogan; W/O. A. R. Lutes; F/O. H. N. Millar; W/O. C. K. Morrow; Flt. Sgt. H. B. Raven; Sgt. J. O. Rice; Sgt. F. Rudd; W/O. E. G. Smith; F/O. M. E. Tomczak; Sgt. W. W. Wright.

MISSING, BELIEVED KILLED IN ACTION.—F/O. W. J. Bentley; F/O. J. F. Dewar.

MISSING.—P/O. E. E. Baker; F/O. W. S. Bond; Sgt. E. E. Boyle; Flt. Lt. J. P. Calder; Sgt. G. T. Douglas, Flt. Sgt. C. J. Foy; W/O. J. W. Heavner; Sgt. D. Lanuziello; Flt. Sgt. G. R. MacArthur; Flt. Sgt. R. T. W. Marsh; F/O. F. C. Montgomery; W/O. J. E. McL. Nixon; W/O. F. G. Oakes; Flt. Sgt. G. R. Pond.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Lt. T. H. Jones.

Royal New Zealand Air Force

KILLED IN ACTION.—P/O. A. A. Wilson.

WOUNDED OR INJURED IN ACTION.—Flt. Lt. B. Coberoft; F/O. J. Lloyd.

MISSING, BELIEVED KILLED IN ACTION.—F/O. W. Andrews; F/O. H. T. Crampton; W/O. G. L. Gillan; Act. Flt. Lt. J. W. A. Myers.

MISSING.—Act. F/O. H. J. Burtt; Flt. Lt. H. J. Meharry; Act. Flt. Lt. N. A. D. Stokes.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. G. L. R. Marchant; Flt. Sgt. J. R. Vogt.

KILLED ON ACTIVE SERVICE.—F/O. G. N. Muirson.

COMBINED OPERATIONS : R.A.F. Coastal Command is now operating from airfields in Belgium, using Albacores and Swordfish. Ground crews are also mixed Here R.A.F. and Navy men refuel a Swordfish.

SERVICE AVIATION

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—F/O. R. B. Graham.

South African Air Force

KILLED IN ACTION.—2/Lt. J. H. Du Plessis; W/O. Raeburn

MISSING, BELIEVED KILLED IN ACTION.—Lt. L. J. Leach.

MISSING.—Lt. C. D. Anderson; Capt. G. S. Brink; Lt. L. V. Essery; Lt. B. V. Gesundheit; Lt. J. W. Gishford; Maj. B. Hutchinson; 2/Lt. W. B. Kewlea; Lt. G. F. Lane; 2/Lt. J. B. McArthur; Lt. J. C. Nel; Lt W. Norval; Lt. E. Rood; 2/Lt. J. R. M. Spruyt; Capt. B. Towy-Thomas; Lt. U. Van-Rooyen.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Lt. D. S. Henderson.

KILLED ON ACTIVE SERVICE.—2/Lt. O. E. Clark.

DIED ON ACTIVE SERVICE.—Flt. Sgt. M. H. Feldham.

Casualty Communiqué No. 451.

Of the names in this list 73 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Air Comdre. I. J. Fitch; Flt. Lt. J. H. Kenny, D.F.C.; F/O. M. H. O. Levin; Flt. Sgt. F. I. Smith.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. N. E. Adams; Sgt. A. E. Baumann; P/O. H. Beane; P/O. I. C. B. Black; Flt. Sgt. G. Brothers; Sgt. E. L. Button; Sgt. W. Dwyer; Sgt. D. T. Gordon; Sgt. J. Mackay; Sgt. J. Morton; Sgt. L. A. Williamson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. McI. Anderson; Flt. Sgt. H. E. E. Attwood; Flt. Sgt. D. Bigmore; Sgt. G. E. Boucher; Flt. Lt. A. F. Brazenor; Sgt. S. W. Bridgman; Flt. Sgt. S. G. Brockway; Sgt. R. T. Brown; Sgt. R. L. Brunton; Sgt. J. R. R. Burfield; F/O. W. D. Crewe; Sgt. J. A. Cullen; F/O. M. S. D'Abadi; Sgt. J. W. Diggle; W/O. F. B. Dixon; Sgt. F. P. Domenech; Flt. Sgt. A. Evans; Flt. Sgt. H. W. Fell; Sgt. M. F. Flynn; F/O. L. C. Gilding; Sgt. C. S. Graves; Flt. Sgt. R. H. Howlett; Sgt. W. C. Hughes; Sgt. F. Lawrence; P/O. A. M. Leonard; Sgt. T. V. Lewis; Sgt. D. J. MacAree; Flt. Sgt. R. J. Money; Sgt. L. Morgan; Sgt. D. W. Moss; F/O. H. C. Pavitt; Sgt. J. F. Phizacklea; Sgt. F. A. Porter; Flt. Lt. E. E. Pudsey; Sgt. P. G. Roberts; F/O. J. E. Robson; Sqn. Ldr. C. F. Rose, D.F.C., D.F.M.; Sgt. G. J. Saunders; Flt. Sgt. J. D. Sheeran; Sgt. E. H. Shimeld; Sgt. C. D. Sims; Flt. Sgt. R. W. Stiff; Flt. Sgt. R. Walton; Flt. Sgt. R. G. Warwick; Sgt. L. Wild; W/O. J. T. Williams.

WOUNDED OR INJURED IN ACTION.—Wing Cdr. N. De W. Boult, A.F.C.; P/O. K. M. Evans; Flt. Sgt. E. S. Leach.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. N. A. B. Cooper; Sgt. J. Corless; Sgt. J. MacD. Craig; Sgt. A. L. Curphey.

MISSING.—Sgt. C. F. Allen; Sgt. G. Allenby; Sgt. F. R. Arnold; Sgt. J. T. Barber; W/O. T. P. Barry; Flt. Sgt. W. J. H. Beardsmore; Sgt. E. S. Beare; F/O. R. W. Blaydon, D.F.M.; Sgt E. E. Boyce; Act. Flt. Lt. E. Broadbent; Act. F/O. A. C. Brooks; Sgt. D. R. Brown; Sgt. E. R. Brown; Sgt. P. W. Buckley; Sgt. W. Butler; F/O. J. C. Byrne; Sgt. T. D. S. Cairns; Flt. Sgt. R. G. Campbell; P/O. R. M. Cass; F/O. S. Chappell; P/O. I. D. H. Clarson; F/O. P. W. Clifford; Flt. Sgt. D. Clisby; Sgt. T. Crane; Flt. Sgt. G. A. Crow; Sgt. J. R. Cuthbert; Act. Flt. Lt. D. Drinkall; F/O. R. H. Duncanson; Sgt. G. F. Ennals; P/O. J. T. Evans; Sgt. M. Evans; F/O. W. D. Fairney; Sgt. L. Fielding; P/O. E. T. Fisher; Sgt. D. J. E. Fontaine; Flt. Sgt. T. J. Foy; P/O. R. B. Garside; W/O. W. Gaughran; Sgt. P. A. Gilliatt; Sgt. J. H. Gilliver; Flt. Sgt. A. Gleason; F/O. E. R. Goddard; Flt. Sgt. J. S. Gordon; P/O. K. J. Gowing; Sgt. E. Graham; Sgt. C. J. Hamilton; P/O. R. P. Hampson; F/O. W. T. Harding. W/O. E. J. Hawker; F/O. J. R. Haynes; F/O. F. Heath; F/O. A. J. Hewetson; Sgt. J. Hodgson; Sgt. L. Hodgson; F/O. R. Holmes; P/O. J. W. Humble; Sgt. J. B. Humphrey; P/O. P. J. Hyland; F/O. H. W. James; Flt. Sgt. E. H. Jenkins; F/O. K. Jones; Sgt. W. M. Jones; Sgt. D. Judson; Sgt. J. E. Kearney; F/O. J. S. Lang; Flt. Sgt. W. E. Leake; Sgt. R. A. Lee; Flt. Sgt. A. Lister; Sgt. M. S. Ludlow; F/O. J. P. McCarter; Sgt. R. W. McCormick; P/O. M. MacDonald; Sgt. R. J. McDonald; W/O. H. McIver; F/O. J. R. Mackney; Flt. Lt. K. Marshall; Sgt. G. W. Mawson; F/O. W. H. J. Mills; Sgt. A. Milne; Sgt. E. T. Money; Sgt. J. T. V. Moore; F/O. M. P. Moreton; Flt. Sgt. I. J. Morris; Flt. Sgt. M. A. Murphy; Sgt. F. B. Newman; F/O. A. W. W. Nipper; Sgt. J. D. C. Noonan; Sgt. K. E. Nottage; W/O. E. J. Parker; Sgt. A. Payton; Flt. Sgt. E. Peel; Sgt. J. E. Pinnock; Sgt. R. J. Pocock; Sgt. T. J. Prince; Sgt. J. E. Prosser; F/O. F. C. Riley; Sgt. K. Roberts; F/O. D. Robson; Flt. Sgt. H. J. A. Rogers; Sgt. F. C. Saunders; Flt. Lt. E. N. Slade; Flt. Sgt. C. E. Smith; F/O. H. N. Smith; Sgt. L. Stafford; P/O. R. J. Stone; W/O. G. H. Stratford; F/O. J. W. Symington; Sgt. R. J. Thair; Sgt. S. W. Thompson; Sgt C. Toft; Sgt. D. R. Tomlinson; Sgt. H. P. Tomlinson; Flt. Sgt. H. Tonge; P/O. H. H. Tuck; Flt. Sgt. T. J. Tucker; Flt. Sgt. D. Vann; Sgt. R. B. Walker; P/O. W. Warburton; Sgt G. E. Ward; Sgt. G. G. Wardle; Act. Sqn. Ldr. H. Wareing, D.F.C.; P/O. R. Webb; Sgt. J. C. Wiggin; P/O. P. R. Wood; Sqn. Ldr. H. Wood.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. J. Payne.

KILLED ON ACTIVE SERVICE.—Sgt. C. E. Church; Sgt. R. A. Culver; P/O. J. W. H. Dibbs; Sgt. G. T. Dodson; F/O. K. J. Hadley; A/C.1 W. J. Lewis; Group Capt. A. O. Molesworth; Sgt. P. C. Read; Sgt. K. M. A. Sexton; Act. Sqn. Ldr. J. L. Smith; A/C.1 O. Taylor; W/O. W. Taylor; Sqn. Ldr. G. A. Wilkins; Flt. Lt. J. R. Wilkinson; L.A/C. E. C. Williams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. N. G. Boxshall.

WOUNDED OR INJURED ON ACTIVE SERVICE.—W/O R. B. Hoare; L.A/C. N. H. Severs.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. B. H. Ballard; Sgt. R. T. Conley; Sgt. D. Gaymer.

DIED ON ACTIVE SERVICE.—Cpl. F. Cartmell; L.A/C. C. I. Crawford; Cpl. R. C. Foxall; Cpl. J. H. S. Hitchen; L.A/C. E. A. Kite; Flt. Sgt. A. L. Rookes; Flt. Sgt. D. Winlow.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. C. J. Lander.

PADRE, AIR GUNNER AND WIRELESS OPERATOR: Sqn. Ldr. Tom Warner (right) combines all these tasks and has been on six operational flights.

Women's Auxiliary Air Force

KILLED ON ACTIVE SERVICE.—L.A/CW. S. A. Mullins.

DIED ON ACTIVE SERVICE.—A/CW.1 J. Jamieson.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. L. W Betson; Act. Flt. Lt. R. Carmichael; Flt. Sgt. W. O. Gaze; Flt. Sgt. N. W. Hayter.

MISSING.—Flt. Sgt. A. F. Joyce; Act. Flt. Lt. R. V. King; F/O. O. S. MacPhillamy; Flt. Sgt. G. M. Miller; Flt. Sgt. A. S. R. Ross; Flt. Sgt. L. Rothwell; Flt. Sgt. E. J. Ryan; Act. F/O. R. G. Turvey; W/O F. W. West.

KILLED ON ACTIVE SERVICE.—F/O. F. R. Barker, D.F.C.; Flt. Sgt. K. J. Taubman.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. G. C. Brown; Sgt. W. M. Conly; P/O. H. Glass, D.F.M.; Flt. Lt. J. D. B. Hall; F/O. T. Jackman; P/O. D. Murray; P/O. W. S. M. Phillips; P/O. L. B. Syme; P/O. C. A. Thompson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Act. Wing Cdr. G. A. McMurdy; Flt. Sgt. F. W. Peterkin; W/O. A. B. Willson; W/O. H. R. Wright; W/O. F. Yackison.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—W/O. G. P. Herman; W/O. G. F. McKinnon; W/O. H. A. Weber.

MISSING.—P/O. W. M. Aldred; F/O. A. Bain; P/O. G. R. Baumann; F/O. W. A. Bell; F/O. D. E. Belt; F/O. P. J. Biollo; Sgt. R. W. B. Carey; Flt. Sgt. R. A. Chetney; Sgt. R. M. Cole; F/O. J. H. Doe; Sgt. J. M. Eadinger; F/O. F. C. Eastley; W/O. T. F. Galbraith; P/O. J. E. Gardner; F/O. G. A. Green; P/O. J. K. Gustafson; Flt. Sgt. J. R. C. Gutcher; W/O. L. W. L. Hambrooke; F/O. J. F. Harris; F/O. J. B. Hurlburt; Flt. Sgt. G. J. Imrie; P/O. G. Karrel; Flt. Sgt. S. L. Krawchuk; Flt. Lt. D. D. Laird; F/O. A. Lindsay; Flt. Sgt. J. M. Lonie; P/O. C. H. McBrien; F/O. W. E. McDonald; Flt. Sgt. C. W. Martens; F/O. G. R. Miles; P/O. D. J. Miller; P/O. K. R. Miller; P/O. R. J. Miller; F/O. A. M. Mills; F/O. C. J. Mitchell; Flt. Sgt. K. J. Murray; W/O. J. J. Ollinger; P/O. L. W. Pattyson; F/O. H. S. Peabody; Flt. Sgt. J. G. Pearce; Flt. Sgt. R. G. Proulx; F/O. H. H. R. Reid; F/O. H. M. Sharpe; P/O. G. E. Sidebottom; P/O. J. Smith; Flt. Lt. R. S. Smith, D.F.C.; F/O. W. J. Smith; Flt. Sgt. A. W. Tuuri; F/O. H. E. Wilson; P/O. W. E. Windsor.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. V. E. Clark; Sgt. J. W Ellis; F/O. A. T. Gorman; F/O. L. A. Green; Sgt. G. Morgan; Sgt. W. L. Southwick.

KILLED ON ACTIVE SERVICE.—Flt. Lt. F. G. Jackson; W/O. J. McBeth; F/O. A. S. McTavish; P/O. V. V. Miettinen; F/O. W. T. Shannon.

PREVIOUSLY REPORTED MISSING, NOW PRISONER OF WAR.—Flt. Sgt. F. C. Boulter.

Royal New Zealand Air Force

KILLED IN ACTION.—W/O. W. R. Tuck.

MISSING.—Flt. Sgt. G. H. Glemens; W/O. J. Finlow; P/O. R. J. W. Hey; F/O. F. G. Stowell.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. M. G. Cleave.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE. Flt. Sgt. R. C. Cornfoot

South African Air Force

MISSING.—Sgt. T. A. Beesley; Lt. D. Elliott; Lt. J. M. Mathieson.

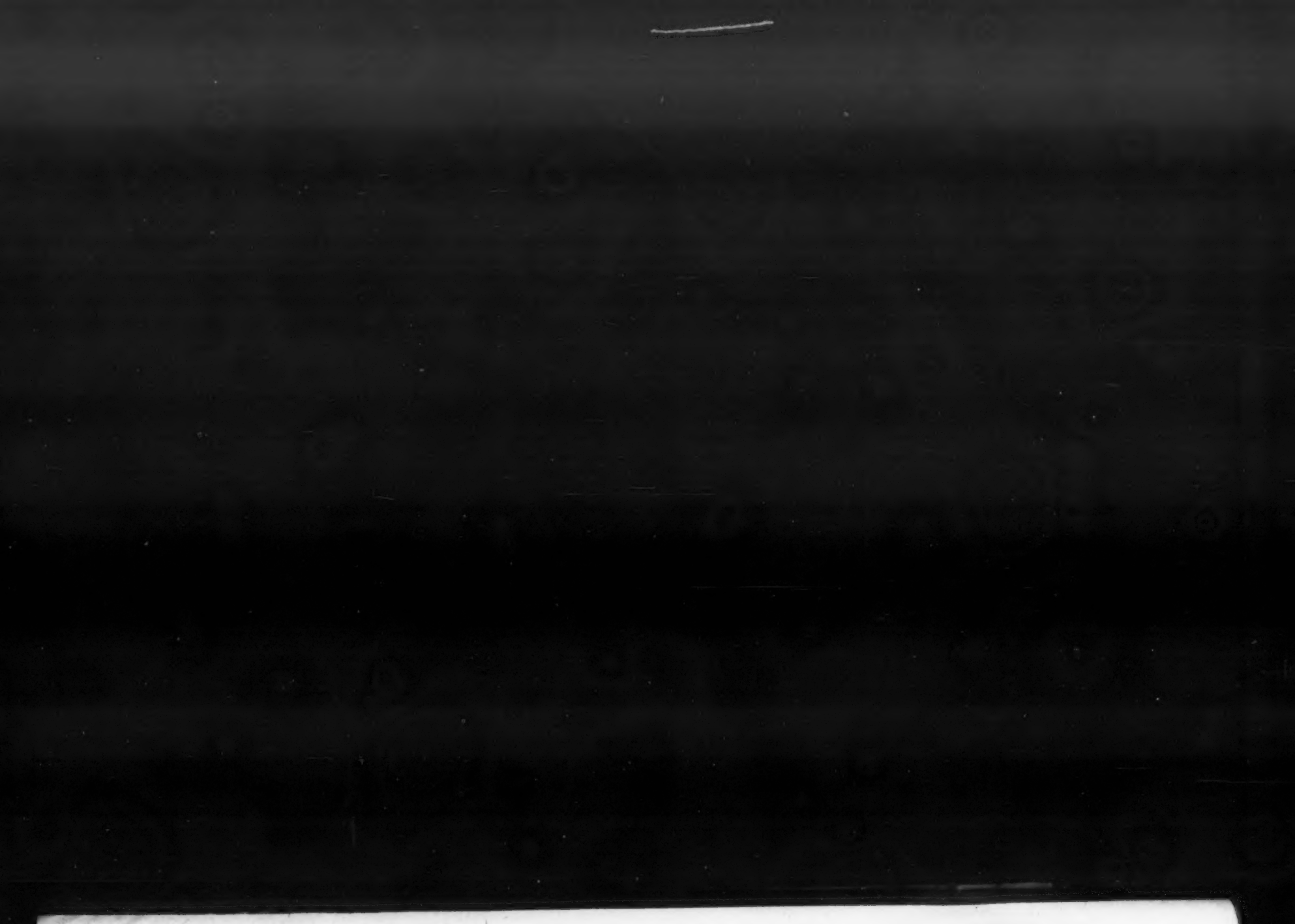
DIED ON ACTIVE SERVICE.—Lt. Col. C. Ginn.

Official Corrections

Casualty Communiqué No. 447.

Under "MISSING, BELIEVED KILLED IN ACTION," delete Capt. P. J. S. Louw.

Under "MISSING" delete Flt. Sgt. R. Ayton, F/O R. A. Banks; Flt. Sgt. L. Bedborough; Sgt. C. Birds; Act. F/O. A. H. G. Bond; P/O. R. D. Bridgeman; Sgt. W. R. Cotgrove; Sgt. F. Eden; Flt. Sgt. F. Fowler; Flt. Lt. J. W. Harder; Flt. Sgt. H. Hoyle; F/O. K. Jenkinson; Sgt. A. Lowrey; Flt. Sgt. N. P. Morris; Flt. Sgt. K. W. Pope; F/O. F. B. Robertson; Sgt. W. P. Rudland; Flt. Lt. A. J. Smitz, D.F.C.; P/O. J. Smith; Sgt. P. O. F. Wadsworth; Flt. Lt. W. C. Walton, D.F.C.; F/O. G. L. Williams.

R.A.A.F.—Under "MISSING" delete Flt. Sgt. E. Burke; Flt. Sgt. E. J. Fallon; Flt. Sgt. L. C. Leak.

S.A.A.F.—Under "MISSING" delete 2/Lt. G. R. Connell.